S·A·E JOURNAL

Published Monthly By The Society of Automotive Engineers, Inc.

C. W. Spicer, President — David Beecroft, Treasurer

John A. C. Warner, Secretary and General Manager

Norman G. Shidle, Executive Editor

Vol. 42 — MAY, 1938 — No. 5

CONTENTS

About Authors

● **Gerald M. Rassweiler and Lloyd Withrow,** *in their paper published in the August 1936 SAE Journal, explained how they took high-speed motion pictures of combustion in internal-combustion engines. Since then they have been using these pictures as tools to determine further what goes on in the combustion chamber. They tell the results of their research in this issue. Withrow began researching for General Motors in 1926 and in 1930 teamed with Rassweiler in fundamental engine research.*

● **Raymond P. Lansing** *(M '21), entered the automobile starting and lighting field immediately after receiving his B.S. from Worcester Polytechnic Institute in 1915. He later became chief engineer of the Bijur Motor Appliance Co., predecessors to the Eclipse Aviation Corp., a subsidiary of Bendix Aviation Corp. He has contributed much to the excellence of aircraft accessories and is considered an authority on accessory drive problems of aircraft engines. Vice-president of Eclipse Aviation, he was recently appointed general manager of the New Jersey Division of Bendix Aviation Corp. plant now under construction at Bendix, N. J.*

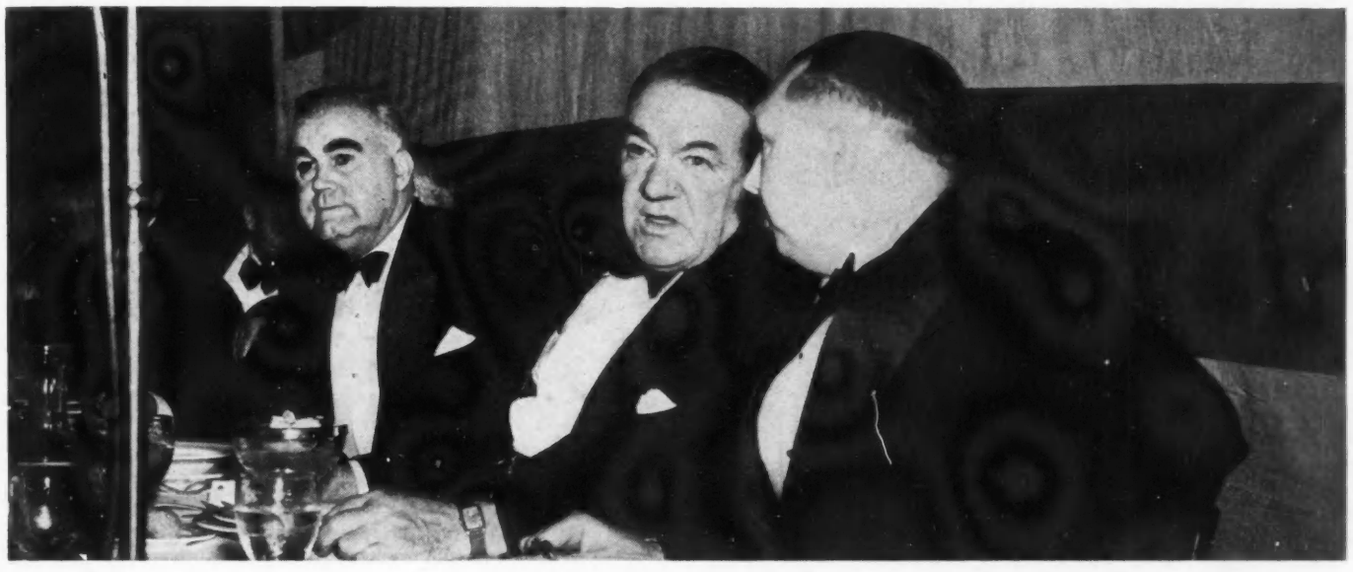
● **Russell Pyles** *(M '27), after graduating from the Air Corps Flying School at Kelly Field in 1922, served with the N.A.C.A. until 1929 as associate mechanical engineer, except for a year at Langley Field as lieutenant pilot, bombardment group. He has subsequently been promoted to captain, Air Corps Reserve. Joining the Diesel-Electric Division of Westinghouse, he was engineer in charge of the Diesel engine section from 1929 until 1936. During this period supercharging development for railway Diesels was pushed and the first supercharged Diesel engine on United States railroads was put into service. Until recently he was with the Chicago Pneumatic Tool Co. as Diesel development engineer, and is now with Clark Bros. Co. in a similar capacity.*

● **J. Trueman Thompson** *entered the Army immediately after graduation from*

(Continued on page 27)

Publication Office, 56th and Chestnut Sts., Philadelphia, Pa.; Editorial and Advertising Departments at the headquarters of the Society, 29 West 39th St., New York, N. Y. Western Advertising Office, Room 2-136 General Motors Bldg., Detroit, Mich.

Design Trends Clarified at First National Passenger Car Meeting



SAE Vice-President Clyde Paton (*right*) was toastmaster at the Passenger Car Dinner at which Gen. Hugh S. Johnson (*center*) was the principal speaker. Fred M. Zeder, vice-chairman of the Chrysler Board, is on the *left*.

THERE is no recession in ideas and no let down in intellectual attainment in the business of automotive engineering," SAE Secretary and General Manager John A. C. Warner emphasized in a brief talk officially opening the First SAE National Passenger Car Meeting at the Hotel Statler, Detroit, March 28-30. The meeting itself bore out that keynote dramatically.

Eight papers were read and sharply debated in four sessions. Everyone who heard them came away with a clearer picture of what future cars will be like. Visits to the proving grounds and laboratories of three major companies were packed into the last day of the meeting. The sessions had an average attendance of more than 300 while dinner attendance topped 600 by a good margin. Everything that anyone could ask, this meeting seemed to have.

Climaxing the technical sessions, Gen. Hugh S. Johnson brought fervent applause as he told an overflowing ballroom at the dinner that "the outlook for business is precisely that for throwing economic snake oil remedies out of the window and acknowledging the simple principles upon which America has grown great."

Technical High Spots

Will the fully automatic transmission take its place chiefly as a luxury device or will it be adopted on all production units? Assuming all other problems of the automatic transmission solved, will the American driver really like to have a robot take part of the control of the car away from him? These moot issues dominated the debates at the Chassis Session. All agreed, however, that the old gearshift lever is doomed. In contrast, the prediction that general adoption of combined body and chassis construction in some form or other is inevitable went unchallenged in the Frame and Body Session. Discussion there centered around its exact form and its effect on other design and production considerations. An interpretive review of the state of the science of "ride engineering" came in three papers at the Car Suspension and Ride Session. At the opening Engine Session, English carburetor and oil men were the targets of critical comments in a comprehensive paper comparing English and American auto engines. A second paper in this session contributed sorely needed fundamental data on supercharging.

Two bus loads of members took the inspection trip on the last day. At the first stop, the Packard Proving Grounds, after hearing a brief talk by C. H. Vincent of Packard, members of the group were driven around the race track and dirt roads. Luncheon at the General Motors Research Building was followed by visits to several laboratories and talks on instrumentation, combustion, and fuels by C. F. Kettering, Lloyd Withrow, and T. A. Boyd, all of General Motors. At the last stop, the Chrysler Engineering Laboratories, members were given an intimate view of a large technical workshop. At Chrysler the visitors were welcomed by SAE Past-President Harry T. Woolson, of that company, who also served as chairman of the Inspection Trip Committee.

"New Deal objectives are all right," trumpeted General Johnson, summing up the dinner's principal speech, "they are faith, hope, and charity. But the methods are all wrong – they are doubt, despair, and hatred. . . . It was never necessary to abandon the gasoline that makes our engine go – private initiative in the hope of reasonable gain."

Citing statistics to show that the American standard of living is still by far the highest in the world, General Johnson pointed out that, with 7 per cent of the world's population,

our people enjoy from 60 to 80 per cent of the world's conveniences, such as automobiles, electricity, telephones, and radios. Our consumption of food and necessities surpasses the average of the earth by 80 per cent, and our nearest competitor by 40 per cent. Our 130,000,000 people have a purchasing power equivalent to 500,000,000 Europeans or 1,000,000,000 Asiatics.

After finishing his speech, the General answered questions from the floor.

Speaking briefly before General Johnson was introduced, SAE President C. W. Spicer recalled that the earliest National SAE Meetings were all Passenger Car Meetings because it was the Society's only activity in its infancy. He congratulated the Passenger Car Activity Committee headed by SAE Vice-President C. R. Paton for the success of the meeting. Mr. Paton also served as Dinner chairman, and W. T. Fishleigh was chairman of the Dinner Committee.

ENGINE SESSION

Chairman R. N. Janeway's gavel fell promptly for the opening session. The first paper, "Motor Car Engines in England" by Alex Taub, Vauxhall Motors, Ltd., was read, in the author's absence, by S. W. Sparrow; later it was dubbed in turn "colorful presentation," "penetrating analysis," and "caustic commentary" by its discussers. A substantial contribution to the data on supercharging was made available to engine designers in the final paper at this session, "Fundamental Investigation of Supercharging" by Richard Sneed, Ethyl Gasoline Corp.

British and American Engines Compared

"English motor cars start badly, lack flexibility, and wear poorly as compared with American cars," Mr. Taub contended bluntly early in his comparison of British and American auto engines. "These are facts," he continued, "and represent the bulk of our attack on English practice," conceding that the British heavy-duty engines are "among the best in the world" despite their weight and cost.

British merchandising methods, taxation, and lubricating oils are among the factors cited by Mr. Taub as accounting, in one way or another, for these differences in engine design and performance.

Because we leave it to the merchandising groups to create public acceptance in America, he pointed out, "we see daily the battle of the billboards, and must get a dose of it every time that we turn on the radio." In England, however, he explained, you don't have to build organizations to get public reactions to anything – the British public will quickly tell you what it likes, or does not like, about your product.

Discussing lubricating oil, Mr. Taub revealed that, before and including 1936, the lubricating oil used in British motor cars varied upward in viscosity from SAE 40. "Need more be said on bad starting and poor bore lubrication?" he asked. Since 1937, however, the English oil has been graded and lighter oils have been used with improvement in starting, he reported.

Small engines are used, not only to meet the tax conditions, but because of the low selling price of these small cars, Mr. Taub explained. The tax is a nuisance to automotive engineers, not from a size standpoint, but from a design standpoint – making it necessary to use an unsatisfactory bore-stroke ratio, he pointed out.

Although the British industry has been offered austenitic sleeves and rings as the cure for cylinder-bore wear, we maintain that 50,000-mile bores are available without these expensive products based on satisfactory results obtained in America, Mr. Taub contended.

Switching to carburetion, Mr. Taub confidently announced that the Vauxhall "Ten" operates on a leaner mixture ratio with complete flexibility than any motor car anywhere. But, to get this economy, he explained, required a different breed of carburetor than was previously available.

Directing his fire on the carburetor men, Mr. Taub continued: "The automotive industry has been for years at the mercy of the carburetor men . . . for 20 years they have drilled and plugged holes to eliminate one type of bad spot and brought in two others . . . each carburetor man has some pet bleed or gadget and, as a given carburetor has passed from hand to hand, it becomes a mass of holes, corners and fittings – each sworn to be vital in function, but the ensemble defying the laws of nature.

"However," Mr. Taub announced optimistically, "we are happy to report that the situation is improving through cooperation with the carburetor men and by looking upon the carburetor for what it is – a good or bad metering device quite unable to overcome variations from other sources. In fact," he challenged, "once we have established satisfactory carburetion in England, we will give you a run for your money in miles per gallon in the four corners of the earth."

"What I have to say may sound like the chant of a 'yes man,' as I agree with Mr. Taub on so many points," explained Mr. Sparrow, the first to discuss the paper that he had just read. However, we haven't been able to explain variation in wear among the different cylinders by any effect of mixture ratio. The carburetor men have their troubles, too, he reminded, graphically recalling the discomfiture of a carburetor engineer when he first viewed the overlaps on an overlapped camshaft.

In written discussion F. F. Kishline, Graham-Paige Motors, Inc., contributed a pertinent experience in which ring-scuffing and poor oil control caused a serious problem. By cutting open the end of an engine and looking at it through a stroboscope, first while cranking and then while it was running in the cold room, we investigated the lubrication, he recalled. Much to our surprise, he continued, it was learned that oil which, according to the pictures in the catalog, was supposed to squirt up on the cylinder wall, was doing no such thing – it merely oozed out of the end of the hole. Substitution of a pressure lubricating system and nickel-plating of pistons and compression rings solved the problem, he reported.

Distribution as influenced by the carburetor still remains the greatest disturbing factor, said Max M. Roensch, Chrysler Corp., reading from prepared discussion, and there is considerable room for improvement in this field. Contrasting the difference in operating conditions in this country and in Great Britain, he recalled the English engineer who, during a discussion of cold-starting problems, remarked that "It sometimes gets down to freezing."

Macy O. Teetor, Perfect Circle Co., in written discussion read by Chairman Janeway, pointed out that the difference of opinion between English and American piston-ring manufacturers is mostly due to the difference in concept of the problems involved and the relative importance of these problems. However, this cannot be the only reason, he continued, because American piston-ring manufacturers differ considerably among themselves.

The job of producing a piston-ring from the ideal material is like working a cross-word puzzle, he explained. One necessary property is always interfering with the securing of a desired characteristic and, if such a material should be found, a new set of production problems must then be solved, he concluded.

Supercharging Data Scarce

Few fundamental data on the effect of supercharging on engine performance are available to designers, pointed out

Engineering Executives Gather at Passenger Car Meeting Dinner

Photographs by Grossman-Knowling Co.

1. W. S. James, chief engineer, Studebaker Corp.
   F. W. Slack, chief engineer, Chrysler Corp.
   Roy E. Cole, vice-president in charge of engineering, Studebaker Corp.
2. James C. Zeder, chief engineer, Chrysler Corp.
   Clyde R. Paton, chief engineer, Packard Motor Car Co.
3. Past-President Harry T. Woolson, executive engineer, Chrysler Corp.
   E. W. Seaholm, chief engineer, Cadillac Motor Car Division, General Motors Corp.
   W. E. England, executive engineer, American Bantam Car Co.
4. Past-President Col. J. G. Vincent, vice-president of engineering, Packard Motor Car Co.
   Fred M. Zeder, vice-chairman of the board, Chrysler Corp.
5. Past-President Ralph R. Teetor, in charge of engineering, Perfect Circle Co.
   President C. W. Spicer, vice-president, Spicer Manufacturing Corp.
6. Harold T. Youngren, chief engineer, Olds Motor Works Division, General Motors Corp.
   Frank E. Watts, vice-president in charge of engineering, Hupp Motor Car Corp.
   James M. Crawford, chief engineer, Chevrolet Motor Division, General Motors Corp.

Mr. Sneed, although much work has been done recently in applying supercharging. The purpose of this paper, he announced, is to present some of these data in a discussion of the influence of supercharging and compression ratio on power output, economy, fuel octane-number requirement, exhaust-gas temperature, exhaust-valve temperature, and heat absorbed by the cooling water.

The test program consisted of three phases, he explained: The first was made up of dynamometer tests on an eight-cylinder engine with the air supplied by a separately driven compressor. The next phase included a group of dynamometer tests with the supercharger connected to and driven by the engine. The final phase consisted of tests on the road, the supercharger being driven by the engine. A discussion of the results of this program occupied the major part of Mr. Sneed's presentation.

Offering his experience as constructive criticism, Mr. Kishline expressed the wish that higher compression ratios had been used in the tests reported. He told of several phenomena that had come up during similar tests that he had not been able to explain.

CHASSIS SESSION

Whether or not the car-buying American public really wants a fully automatic transmission, and whether it can be had without extra cost if it is wanted, were moot points that divided discussers in this session into two camps. The issues were raised by the first paper: "Transmission and Control Developments," by S. O. White, Warner Gear Division, Borg-Warner Corp. Following spirited debate on the subject, Chairman G. L. McCain introduced C. E. Bleicher, Chrysler Corp., who read his paper: "Car Cost Control."

Automatic Transmission Called a Luxury

The automatic transmission seems to be a luxury device chiefly; its safety features are negligible; and its flexibility and economy of operation can be secured by simpler and cheaper means, contended Mr. White in the session's first paper.

The amount of effort put into the development of automatic transmissions has been tremendous, he continued, and out of all proportion to the value of the results obtained. They are always expensive, and their general public acceptance is yet to be demonstrated, he went on.

Claiming that a transmission cannot be fully automatic and still meet all the conditions of the road, he pointed out that controls must be added so that a driver can overrule it when its action doesn't suit him. "The average driver wants to drive his car the way he wants to drive it, even though his way is wrong," he asserted.

All that is required is offered by a four-speed transmission, automatic between the two top speeds, and effortless shifting handled by a finger-tip remote control, Mr. White believes. A good automatic clutch also would be a greater help to the driver than an automatic transmission, he added, and would not cost anything near as much. To get the most out of it, however, he qualified, usually requires the use of free-wheeling or, at least, a semi-automatic transmission.

Such good progress has been made on remote control, he concluded, that it now seems that the old "wobble stick" or gearshift lever in the floor is on its way out at last.

As an appendix, Mr. White read the anonymous comments of eleven well-known experts in the transmission field, many of which backed up or supplemented his conclusions.

One reason that so much work is being done on automatic transmissions is undoubtedly that it is a very fascinating problem, pointed out P. M. Heldt, *Automotive Industries,* in prepared discussion. During the twenties, he recalled, most of the inventive effort was spent on continuously variable transmissions, whereas today it seems to be directed mainly at the development of stepped transmissions that permit driver control over the speed at which the automatic shift occurs. He called attention to the stimulating effect that materially higher fuel prices might have on automatic transmissions and overdrives because of their fuel-saving ability.

Were there available a really flexible transmission with a wide or infinite number of ratios between the desirable limits, it would go far toward eliminating the desire for fully automatic control, contended Austin M. Wolf, consulting engineer, in written discussion read by Norman G. Shidle, SAE JOURNAL. The ordinary driver becomes confused at a critical moment over the steps in the ratios, he went on, whereas, were he able to feel his way by small increments and without a break in the continuity or torque, he would sense almost instinctively what would be the proper thing to do. With such flexibility available, automatic operation would have less appeal although it could be worked out easily, he concluded.

Recounting early experience with an underdrive four-speed transmission, A. G. Herreshoff, Chrysler Corp., contended that the one serious obstacle to its success was the American driving public – it, collectively, would not shift gears. In European countries, he pointed out, automobile owners are proud of their ability to choose the ideal gear, and they seize upon every opportunity to do so. But in America, he continued, drivers insist on getting into the highest available gear at the earliest possible moment and staying there. In closing, he summed up the automatic-transmission picture by quoting from an English magazine: "This automatic transmission has the irritating habit of shifting ratios at the theoretically correct time, but when least expected and desired."

We all want the automatic transmission if it means that automatically we will always be in the gear ratio that gives optimum results, contended Karl Britton, Britton Controls, Inc. And no driver can choose the right set of gears all the time, he continued. Let's go all the way and stop trying out half measures, he urged, pointing out that gear-shifting is easy, but it isn't right. What the average driver does not want is the kind of operation that he *thinks* the automatic transmission will give him, he explained.

Taking issue sharply with the claims of previous discussers that the automatic transmission is "fun at first and then you get tired of it," Mr. Britton challenged: "Try a real fully automatic transmission, and then try to go back to shifting gears."

O. H. Banker, New Products Corp., told of early struggles in getting his automatic transmission adopted, explaining how he had been sent back and forth between the passenger car and bus manufacturers before it was finally accepted by a bus operator. These transmissions are now installed in 500 buses and have traveled 20,000,000 miles, he announced. They have effected a definite saving of gasoline, and have increased safety, he contended, the latter claim in answer to Mr. White's contention that safety features are negligible.

Perhaps a fairer test of the automatic transmission would be to put the proposition up to a person who has never driven before, suggested Harry T. Woolson, Chrysler Corp., as the 30,000,000 American drivers who have been taught to drive by shifting gears are perhaps a little biased.

On the means of control from the mechanical brain to the rear axle is where I split with Mr. Britton, explained Mr. White in summary. After all, he concluded, the public will be the final judge in this debate.

Cost Control Starts with Idea

Car costs originate in the sales division, believes Mr. Bleicher, as it is this division which specifies what equip-

ment must be on the car to make it competitive. Among the many suggestions made in his paper to reduce costs, Mr. Bleicher stressed the desirability of close cooperation with the vendors of parts purchased outside in order to take advantage of all possible short cuts. Vendors should be solicited for information and suggestions, he urged, as they are more hesitant in coming in and asking for changes than your own shop would be; they are apt to add cost rather than to ask for changes that will effect savings.

Car cost control should begin with the idea of the car and continue through until the job goes out of production. It depends heavily on everyone doing his job, and on complete cooperation among all divisions, Mr. Bleicher summarized.

Three considerations important from the cost angle were contributed by W. G. Kileen, General Motors Corp.: (1) price class or competition, (2) return on investment, and (3) effect of volume on costs.

Going a step further than Mr. Bleicher, Frank Misch, Chrysler Corp., contended that car costs really originate with the buying public if cars are to be built so that the average man can buy them. Then, to stimulate sales, give him more and more value at the same price, he recommended.

With a cost study group that is under the control of the engineering department, but is rotated around through the plant, a lot of money can be saved, suggested E. H. Smith, Packard Motor Car Co.

The consumer's viewpoint was voiced by L. C. Rice who announced that he had purchased and driven 22 cars in the last 22 years. No product anywhere gives as much value for the money as does the American automobile, he contended.

CAR SUSPENSION AND RIDE SESSION

A composite picture of what a number of experts think should be done to improve the riding comfort of 1938 cars; an interpretive review of past and expected future developments in automobile springs; and a discussion of ride-control methods used to get a flat pitch-free ride, were the subjects of the three papers read to over 300 at this session. As announced by Chairman E. H. Smith, the papers were respectively: "Riding-Comfort Requirements," by R. W. Brown, Firestone Tire and Rubber Co.; "Recent Developments in the Design of Passenger-Vehicle Suspension Springs and Their Application," by Tore Franzen, Chrysler Corp.; and "Notes on Controls and Calibration," by C. R. Paton, Packard Motor Car Co.

Questionnaire Interpreted

"Requirements for improved riding comfort emphatically include better vision and improved seats," asserted Mr. Brown, reporting the results of a questionnaire sent to members and past members of the Riding Comfort Research Committee of the SAE. Definitely indicated for improvement by the results, he continued, are ventilation; suspensions; noise; roads causing short, sharp vibrations; and "wavy" roads. According to the majority of those polled, he said, road roughness is definitely the most important cause of uncomfortable vibration. On the question of whether "soft" suspensions are justified at the expense of increased body roll on turns or of nosing-down on brake application, opinion was closely divided, 13 out of 25 holding that the increased riding comfort of these soft suspensions during most of their ride was not worth such a cost.

That "damping appears to be the most important single method that can be applied to all elastic parts to improve further the already excellent comfort performance of the modern motor car," was one of the important conclusions reached in a riding-comfort study made on a precision machine that gives the combined dynamic properties of the spring and shock absorbers, Mr. Brown announced.

To assist his audience to visualize the numerous items entering into riding comfort and their interrelationship, he displayed a "riding-comfort tree," on which these items are charted, based on road, car, and human factors.

Torsional Springs Held More Economical

Torsional springs are more economical than leaf springs, said Mr. Franzen, according to a recent analysis of the subject. Leaf springs are still the more popular type because they can carry other functions, he explained. Inserts between leafs are becoming more popular, he continued, with one company using an impregnated fiber strip the whole leaf length. Still another manufacturer is using inserts of three distinct materials – rubber, bronze, and lead-antimony alloy – for the purpose of obtaining a balanced damping and freedom from squeaks.

Torsional springs as they are applied to American cars are generally in the form of helical springs, he pointed out.

Interest in springs that use air as the flexible medium is still alive, Mr. Franzen reported, mentioning as examples the one of rubber described at the 1936 Annual Meeting of the Society, and the metallic telescopic type used on large airplanes that have been applied experimentally on automobiles.

Rubber as a spring medium in compression or elongation, Mr. Franzen believes to be relatively expensive – even though it is being used on one European luxury car – in view of the fact that bearing loads are quite high and it is necessary to use long crank arms which must be rigid. Rubber as a spring medium in torsion, however, holds interesting possibilities and is being experimented with extensively, he remarked.

The frequency of cushion springs has been dropped in sympathy with the drop in suspension-spring frequency, Mr. Franzen explained. A discussion of recent developments in test machines for cushions and of the damping action of various cushioned constructions, comprised the remainder of Mr. Franzen's presentation.

Referring to a chart shown by Mr. Franzen that indicated that a leaf spring weighs 50 per cent more than a helical spring of the same resilience, W. H. Wallace of Eaton Mfg. Co. pointed out that such a comparison may be somewhat misleading because the steel rods for the helical springs cost about 71 per cent more than the leaf steel, making the cost of the leaf spring steel lower than that of the helical spring.

Advertising men are trying to create the false impression that torsional springs are modern and leaf springs are obsolete, contended W. E. Hendrickson, The Mather Spring Co. As a matter of fact both types are very old, and each has its particular field of application as always, he explained.

In addition to absorbing road shocks, the leaf spring serves as an alignment member, and a driving and torque member, all of which is represented by a total of 37 lb. of spring weight to carry and propel the front undercarriage of a popular car in the 3000-lb. class, pointed out S. P. Hess, Detroit Steel Products Co., in written discussion read by Norman G. Shidle, SAE JOURNAL. This is really putting steel to work, he contended. Better steels and better heat-treatment of leaf springs have made this achievement possible, he explained.

More Work for Shock Absorbers

Shock absorbers have additional responsibilities today, and should be called more properly "ride controls," so great is the importance of proper damping characteristics in obtaining the newer "flat-type" rides, announced Mr. Paton. He explained that his paper would discuss the problem of the control or damping of springs and would give some of the factors that

are important from balance standpoint in securing flat pitch-free ride characteristics. His discussion was limited to ride problems pertinent to cars equipped with independent-type front and non-independent rear suspensions. Even with such a limitation, Mr. Paton said, there is little agreement among designers as to either the friction level desirable or the ratio of friction between front and rear suspensions.

After considering the tremendous number of interrelating factors involved in the attainment of ride excellence, it becomes quite clear why really effective instrumentation has never been developed, Mr. Paton reasoned. Certain factors can be measured, he said, but the maze of compromises involved will always require the experienced observer. On his judgment the excellence of the product, in many important respects, will depend, he concluded.

Placing additional responsibility on the shock absorbers by reducing the friction in the suspension elements often has been found to be detrimental to riding comfort, cautioned Carl H. Kindl, Delco Products Division, General Motors Corp., urging that all elements involved be considered in riding-comfort studies.

The human factor seems to have been neglected in the discussion, opined R. N. Janeway, Chrysler Corp., as the final judgment depends on the effect on the passenger. Perhaps we need to call in the psychologist and the physiologist to study human tolerance, as the work seems a little out of the field of the engineer, he suggested. There also seems to be entirely too much reliance on shock absorbers and friction to overcome inherent weaknesses in the entire suspension system, he added.

Fundamental studies of the psychological and physiological effects of various types of rides on the passenger have been made from time to time, and the data have been employed in the work of the riding Comfort Research Committee, was Mr. Brown's reply to Mr. Janeway's suggestion. These data are available in the literature, he continued, perhaps the greatest contribution being the work of Moss published in the SAE JOURNAL in 1926. Referring to the term "ride experts" used in Mr. Paton's paper, Mr. Brown doubted whether any one really knew enough about the science at this stage in its development to deserve such a title, unless he was "out of school about three months."

FRAME AND BODY SESSION

Will combined body and chassis construction be adopted generally for American cars? If so, what will be the effect of this change on the duties of automotive engineers, on overall weight, on costs, on suspensions, and on production and assembly? These were some of the issues raised in the relatively short paper read at this session: "Body and Chassis Development," by Joseph Ledwinka, Edward G. Budd Mfg. Co., that stimulated a lively give-and-take debate that continued for almost two hours before being terminated by Chairman John Oswald.

New Duties for Body Engineers

Body engineers will have to step out and absorb some of the duties of the chassis engineers when combined body and chassis construction is adopted for quantity-production cars, predicted Mr. Ledwinka, as there is no doubt of the general adoption of this construction. W. A. Graf, also of Budd, read Mr. Ledwinka's paper in his absence. Almost all new European models are being built this way, he said.

Integral body and chassis construction brings an assembly problem that appears, at first, almost insurmountable, Mr. Ledwinka continued, but that it seems to work out very nicely after careful consideration. Assembly can be worked out in such a manner, he explained, that the assembly of engine suspension, axles, and so on, can be done from the outside. Sometimes it may be necessary, he continued, to attach the body to a jig, turn the unit upside down, and attach the suspension, axles, and so on, in this position.

Answering his own question on what is to be gained by the new construction, Mr. Ledwinka mentioned reduction in the number of individual units, maximum stiffness in all directions, elimination of noise and squeaks from former joints between body and frame, faster assembly, and considerable weight saving.

Various features of combined body and chassis construction were illustrated by means of slides showing examples of this construction as it is employed in various European production cars.

Lead-off man in discussion was Theodore Ulrich of the Edward G. Budd Mfg. Co., who elaborated on the advantages of unit construction in prepared discussion. The principal advantages, he specified, are a steel weight saving of about 15 per cent in the body and frame unit, better riding qualities, and elimination of body mounting. Against these benefits, however, he continued, must be weighed the change from conventional procedure. Apart from the plant changeover itself, Mr. Ulrich does not believe that the revised methods of assembly will create any disadvantages.

"Perhaps, with unit construction, we engineers will get a chance to ride in a new body before the show cars are shipped," commented F. F. Kishline, Graham-Paige Motors, Inc. Unifying of the body and frame seems ordinary common-sense procedure to meet the demands for reduced weight, fuel economy, and lower cost, especially with fewer body types than were necessary in the past, he contended.

One problem of body engineers using unit construction will be to get the information quickly enough to those who have to finish the car, pointed out Chairman Oswald. Another question, he continued, is whether or not unit construction will pay out when we consider that frame steel is 6 cents per lb. and body steel costs 20 cents per lb.

Agreeing that more stiffness is what is needed, D. W. Sherman, A. O. Smith Corp., pointed out that a more rigid construction could be obtained if the body and frame were tied together. By this means, he explained, a much lighter frame could be used – so that the combination will be just as light, Mr. Sherman believes, as the equivalent unit or composite construction.

Speaking from experience with the 1934 Chrysler Airflow which, he pointed out, was practically of one-piece construction, A. G. Herreshoff, Chrysler Corp., stressed the importance of differentiating between strength and stiffness, pointing out that stiffness is needed primarily in a car. Those of you who have ridden in the Airflow will admit that it is especially good in producing a feeling of rigidity, he contended. Although we found this construction to be more expensive in the Airflow because of detailed design, not because of type, unit construction should be cheaper because it is lighter, he concluded.

Surprise that no one had mentioned that Lincoln-Zephyrs had been built of unit construction for some time, was expressed by Joseph Geschelin, Chilton Co. Because of the new construction, assembly has been simplified and they were able to cut down the length of the line considerably at Lincoln, he reported. Appropriate changes, of course, had to be made in the sub-assemblies, he added.

A construction of making the entire unit body and frame out of two huge stampings joined at the top and bottom, was advanced and discussed by L. L. Williams. Tore Franzen, Chrysler Corp., stressed the necessity for adequate consideration of the effects of any change of construction on the suspension system.

The Greenbrier

THERE will be *action* at the 1938 SAE Summer Meeting!

To the theme "Keeping Ahead of Progress," 15 sessions are being packed with technical meat for fact-hungry engineers.

Eight SAE Activity Committees are sponsoring foremost authorities in their fields as speakers — including two important English engineers.

They will divulge the most recent information . . . research findings . . . that will be the basis for advance on every front of automotive engineering.

An *innovation* this year will be a series of *informal conferences* designed for more intimate discussion of session papers and allied subjects.

Passenger-Car Engines and Chassis, *Diesel Engines*, Aircraft Engines, *Fuels and Lubricants*, Electrical Equipment for Trucks, *Bearings* and Military Automotive Equipment are a few of the general subjects for discussion.

And here is *news*—a chassis assembling contest is scheduled. Members who saw a similar contest held in 1927 will never forget that entertaining riot.

These are only highlights . . . there will be *action* from the time the meeting opens with a huge *SAE Banquet* Sunday night until the final session is adjourned on Friday.

See Bulletin for Program

Your Society

The Council

By Philip H. Smith

TWENTY men guide the destiny of the Society of Automotive Engineers.

The Council, for that is the correct title for this influential body, has the last word on all matters affecting the Society, but its acts are fixed within limits set by the Constitution. The right to act is conferred upon it by the membership, and the group of twenty is broken up and re-formed every year.

A council is an assembly for consultation or advice, according to Mr. Webster, but the definition is inadequate to tell us how this Council works in practice. What does the body consult about and what does it advise upon? Even more important, and much more fundamental, how does the Council come to be the powerful body it now is? Its structure and its rights and privileges must have real significance to anyone who would grasp its purpose.

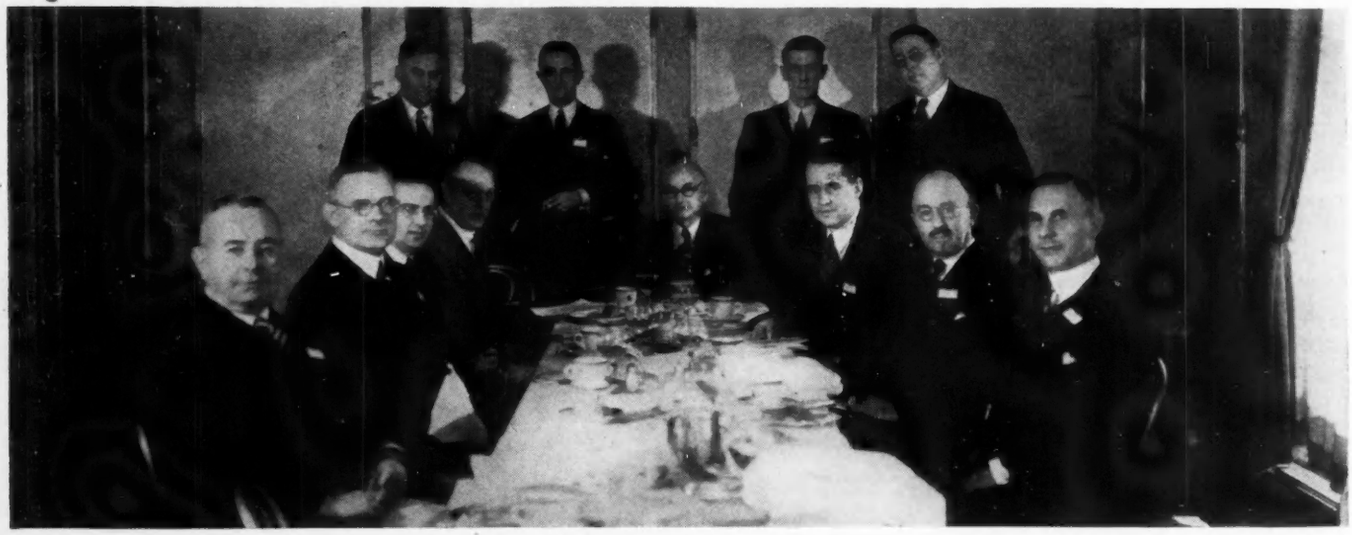
Attendance at a Council meeting would answer a host of questions; so we had best begin with a visit. Every meeting is different from every other because of the variation in the subject matter, the composition of the body, and, of course, every presiding officer has his own peculiar style. But by and large a single meeting reveals enough for our purpose.

At the appointed day and hour the Council members come together and relax for a moment in groups. Probably they chat about current events and ordinary shop problems, and, as men are likely to do in any informal gathering, they pass judgments freely and with finality.

If the meeting is preceded by a luncheon, the setting becomes even more commonplace once the food is consumed. The waiters retire, leaving water glasses unfilled and the carafe at the opposite end of the table from where you sit. Then the Chairman raps smartly with his gavel and the meeting is on.

A great deal has taken place, however, before the sound of the gavel hushes the group. The Executive Committee of the Council, appointed by the President and confirmed by the Council, has been digging into problems which require the running down and coordinating of many facts before discussion about them can be carried on intelligently. An agenda has been in the hands of every Council member for at least a week and he is expected to have familiarized himself with the work that lies ahead. If a Councilor wishes to get more light on a topic before the meeting convenes, he has had ample chance to do so and he is ready to express his viewpoint born of his researches.

This preliminary work of the Council meetings paves the way for the running off of Society business in a businesslike fashion. And it is businesslike, although once the meeting starts there's a fleeting impression that here is a body devoted to wasting time; that most items might better be referred to



The Council was smaller in 1929 than it is now. In 1930, a major change in the Constitution set up nine of the present ten Activities with a vice-president representing each one. This is one of the meetings of the 1929 Council; W. R. Strickland was President.

Those in attendance were: (*left to right, seated*) Vincent G. Apple, O. C. Berry, C. B. Whittelsey, Jr., Coker F. Clarkson, President W. R. Strickland, Edward P. Warner, O. A. Parker and Walter T. Fishleigh, (*standing*) Ellis W. Templin, Frederick C. Horner, F. G. Whittington and J. W. White.

the staff for action. But after a little while, as the meeting unfolds, you change your mind. The items which seemed trivial when isolated for discussion are never really isolated and never can be set apart. A decision upon them usually involves a policy for the entire organization, and the link between the small and specific and the large and the general is what comes out in the discussion. Here many and diverse minds come to meet – and as they succeed in meeting, the viewpoint is broadened and the Society's manifold interests and energies are unified.

At times the deliberations of the Council are slow. The point at issue may appear to become clouded and even lost; then to be re-discovered, clarified and finally acted upon. But this is the democratic process at work. Every man has his say. It is the tangling and disentangling of an issue with all the irritation it may create in the unenlightened spectator which brings final clarity, harmony and then action.

Why is it, you ask yourself, that men who seemed so decisive in their comment prior to the sound of the gavel are now moving so deliberately? The answer comes – it is the democratic process again, only now responsibility is firmly attached. Responsibility forces prejudice, narrowness and self-interest to stand aside and permit the larger conception to prevail.

The matters that come before the Council are seemingly endless and rather dry to enumerate. To say that it acts upon all matters affecting the Society is to tell everything but say virtually nothing helpful. In every meeting there are routine items to be acted upon and several special ones. Membership matters provide a good example of the former. The Council considers every name of an applicant for membership; the fitness of the man to become a member of the Society and his proper grade. The Grading Committee has already gone over the application with a fine tooth comb, has made its recommendations, and the facts are available in detail for the Council member.

Instance of a special case for Council action would be the formation of a new Section. Somewhere a group of 50 men would have signed a petition asking for the new Section and the Council will have to decide whether or not to grant the request. The petition alone won't serve. Will the new Section be of real service? Does the proposed territory overlap that of an existing Section? What are its possibilities for growth, does it have sufficient vitality? All these questions must be answered before the final decision is made.

THIS is the third article of a series on "Your Society."

This series aims to bring alive every phase of Society functioning as related to the individual member.

Philip H. Smith, contributing editor to *Scientific American*, was chosen by the Publication Committee to analyze the Society's functioning and to interpret it as it appeared to an informed outsider.

When D. G. Roos was president in 1934, one of his Council Meetings was held at Chateau Bendix in South Bend, where the Councilors were guests of Past-President Vincent Bendix.

At the meeting were: (*left to right, front row*) John A. C. Warner, Past-President Dr. H. C. Dickinson, Past-President A. J. Scaife, Past-President Vincent Bendix, President D. G. Roos, Walter T. Fishleigh, Floyd F. Kishline; (*back row*) C. B. Whittelsey, Jr., James M. Crawford, A. K. Brumbaugh, Robert Insley, A. Ludlow Clayden, James B. Fisher and Leonard V. Newton.

Perhaps the request has come for the holding of a special Activity meeting. This would not be classed as routine. The request comes from those interested in the subject, naturally. The Council must decide whether the topic warrants a section, regional or national meeting, and if the date chosen is best or conflicts with some other meeting of importance. Is the place of meeting and the projected program well chosen

from the standpoint of serving the greatest number of members? What does the meetings committee recommend? These and many other considerations must be weighed by the Council before action is taken.

Every Activity will wish to hold a certain number of meetings in the course of the year, and the programs will have to be given consideration as they are presented by the vice-presidents. This is hardly a routine matter although it arises annually. What will be strictly new will be the ideas sponsored by the Council. The turnover of members means also turnover of ideas. From time to time every Council member will have certain things which he thinks will be valuable to the Society. These will be presented and winnowed for whatever value they have, and this makes for a continued enlivenment and reconsideration of policies, for repeated testing and re-adjustment to Society needs.

There is a diagrammatic way of presenting the Council which may help to explain the purpose of its lengthy and detailed deliberations and to indicate upon what basis the final decisions are made. We can think of the Society as a flywheel whose rim is composed of many segments, each segment representing Sections or distinct activities. If the segments remain firmly affixed and give of their momentum to the whole, the flywheel operates smoothly and in balance, and in return the segments benefit from the joint momentum. If a segment flies loose to make a meteoric flight, its pretty achievement is of short duration and the balance of the whole is destroyed. The work of the Council, therefore, is basically one of maintaining a balance to achieve a steady group velocity.

Council Smaller at Start

The Council was not always composed of 20 members. As a matter of fact, the present number is just double what it was when the Society was formed. And its character has changed as well. Both alterations represent an adjustment to the growth of the automotive industry and the accompanying expansion of the Society. Its present complexion is purposive and not at all haphazard. This growth is well worth tracing with some explanation.

The Council began in 1905 as a body of 11, being comprised of the president, two vice-presidents, six managers, the treasurer and the secretary. Between 1905 and 1910, first one and then two past-presidents were included and the secretary was dropped. In 1914, the six managers were designated Councilors. No further changes of importance took place until 1917. In that year, the number of second vice-presidents was increased to five and one past-president was eliminated. It was not until 1929 that *two* past-presidents again were incorporated in the Council.

The second vice-presidents represented specific divisions within the automotive industry, namely, motor car, aviation, tractor, marine and stationary internal-combustion engineering. Here we have the first indication of an adjustment to changing times; an acknowledgment of specialized growth within the industry itself.

Of far greater importance, however, was the alteration in the composition of the group which occurred in 1929 after a long and heated discussion among the members. This change was to substitute for the five vice-presidents, eight vice-presidents representing specific professional activities of the Society, which were designated as aircraft, aircraft engine, Diesel engine, motor truck and motorcoach, passenger car, passenger car body, production, transportation and maintenance engineering.

On the face of it this change would seem little more than a substitution of terms. Actually it was much more than that. There had been agitation among members for more positive representation of these activities on the Council and a stated claim that there existed these special spheres of interest within the interests of the Society as a whole. In accepting the truth of this claim and adjusting to it, the Society recognized the value of intensified interest in the specific and set about organizing the machinery which would insure that greater autonomy gave the necessary stimulation without impairment of organization solidarity.

Accompanying a change in Council structure went a change in method of nomination and election that is not without its significance. The five vice-presidents who had served from 1917 to 1929 had been placed on the Council by the members as a whole through annual nomination and election. Even though they represented divisions they were chosen upon a broader base of interest. With the act of 1929 this was to alter radically.

Vice-presidents representing professional activities as today constituted and recognized are nominated by a nominating committee which is composed of seven men duly elected by members representing the particular professional activity concerned. Since the vice-president is to represent a group on the Council, those whom he is to represent are his nominators. He is to be the spokesman for the group at Council meetings and if there is to be any special pleading he is the man to do it.

Once the divisional idea was adopted, it paved the way for further developments of like nature, and so between 1930 and the present we find two more vice-presidents being added to the Council as quickly as members voted that there be the new divisions of fuels and lubricants engineering, and tractor and industrial power equipment engineering.

Coincidental with this basic change there had to be a decision made as to what constituted a professional activity. This has little place in a discourse on the Council, but we may say that the activities had to be decided upon a national basis and the By-Laws needed revision to handle the situation.

The representation of the Council is a very broad one today. Aside from the profession activities representation, which is quite specific, the interests of the Society as a whole are thoroughly covered. The president and treasurer handle matters of major concern to the Society. Then there are the six councilors-at-large, and two past-presidents who sit on the Council to contribute their experience and a certain continuity to its deliberations. Prior to 1929 only one past-president was a member, but the second was added at that time in an effort to retain the active services of seasoned men who had become invaluable to the Society and who could help in maintaining a desirable element of coordination and continuity.

The Committees and the Council

The Committees, of which there are a great number, provide another form of representation. These groups consider certain phases of Society work and take action on their findings. These acts then come before the Council for final approval.

The system of elections is such that a steady stream of new blood enters the Council, while old and seasoned heads are retained. Elections are both indirect and direct. The president, treasurer, and past-presidents are seated indirectly through election to the offices which they fill. Vice-presidents are elected annually, while three of the six councilors-at-large are elected every year to serve two years, thus creating an overlapping arrangement.

All councilors contribute their time and energy, and no remuneration is given for their services. Meetings are held about ten times a year and because they are held in various localities there is much travel. While regular attendance is desirable, the individual member has some leeway. One-third

(*Continued on page* 24)

Tractor Design Future Explored at National Meeting

FUTURE tractors will stand up longer and cost less – thus satisfying the needs of millions of new and prospective owners – according to design plans revealed at the 1938 SAE National Tractor Meeting at the Schroeder Hotel, Milwaukee, Wis., on April 14 and 15. "Engine Wear" – with the accent on its prevention – and "Deflection Tests on Transmission and Axles" – in order to find ways to increase their ruggedness – were the two principal subjects under discussion at the technical sessions. As expressed by one speaker, maximum life is needed because the tractor owner is demanding a machine of the same long-life characteristics to which he has become accustomed in his modern passenger car and commercial vehicle. It was evident from the discussions that both tractor engineers and manufacturers are abreast of the means of satisfying these demands.

With an attendance of 450 that converged on Milwaukee from 14 states, this meeting proved to be by far the largest of this Activity since it was instituted in the spring of 1934.

The program was well balanced in providing two technical sessions and an equal number of demonstration tours by way of proving theoretical and factual information developed by the discussions in sessions, and a rousing Tractor Dinner as a climax. These proving grounds consisted of the tractor plants of the International Harvester Co. and the Allis-Chalmers Mfg. Co.

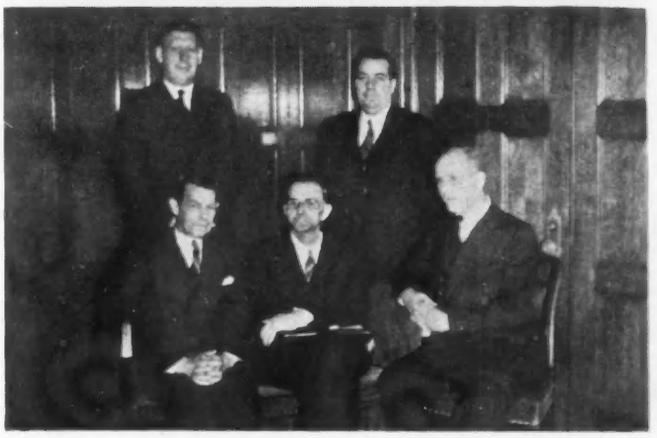
In spite of the pessimistic doctrines of certain political economists, there exists today vast "New Frontiers for Smart People" to conquer, contended Dr. James S. Thomas, president, Chrysler Engineering Institute, the principal speaker at the Tractor Dinner, before more than 300 inspired listeners. His speech was delivered in the brilliant style with which many SAE members became familiar when they heard him talk at the 1936 SAE Annual Dinner in New York. Before hearing Dr. Thomas, the diners had heard John A. C. Warner officially extend greetings for the Society; he was followed by SAE President C. W. Spicer who made a brief address. C. E. Frudden, SAE vice-president for the Tractor Activity, was chairman at the Dinner, and V. R. Jacobs served as toastmaster.

Greater Stiffness Recommended

The subject of deflection tests of axles and transmissions was analyzed thoroughly in the opening session, with E. G. Boden, Timken Roller Bearing Co., presenting the paper that received critical examination through discussion by spokesmen for a wide variety of interested industries. He was introduced by Elmer McCormick, session chairman. Mr. Boden said that it is essential in order to obtain maximum fatigue life from such gears that they be mounted most rigidly and installed on rigid shafts and housings. This ideal is not accomplished in commercial installations, he pointed out, but is modified by economic considerations. He expressed the thought that the axle of a low-priced car would be expected to have, say only 30 per cent to 50 per cent of the life of that of a high-priced car before any service is required, and that this same reasoning will apply to tractors, trucks and other equipment. This contention was challenged broadly in subsequent comments of other members. In most instances, however, agreement was voiced with Mr. Boden's statement that it is more economical to renew certain parts of a machine at more or less frequent intervals than to design such parts to have a fatigue life equal to that of the whole machine.

Mr. Boden related the experiences of his company over a period of 12 years in finding relative factors by means of special testing equipment in its laboratory, modified from time to time to meet changing conditions, admitting that

Prominent at Milwaukee



(*Above*) Tractor Meeting Committee: A. W. Lavers; C. G. Krieger, Chairman; and Elmer McCormick.

(*Below*) At the Dinner: *Standing*, V. R. Jacobs, Toastmaster, and John A. C. Warner. *Seated*, J. S. Thomas, C. W. Spicer, and C. E. Frudden, SAE Tractor Vice-President.

H. F. Bryan, chairman, Chicago Section; C. W. Spicer, SAE President; and G. W. Curtis, chairman, Milwaukee Section.

most of his experience has been on passenger-car and commercial-car transmission and axle subjects, Mr. Boden pointed out that it will apply largely to tractor parts of the same type. One object in making the tests is to determine what effect the change in axle torque produces on the tooth contacts, he explained. After the maximum torque has been applied, load is removed and deflections are noted in order to see if any permanent set has occurred due to some particular weakness, he continued, then investigation is made to determine cause and recommendations are made to improve the design.

Tests were conducted in low gear, in third gear, and in reverse, these being the worst conditions causing deflections in the transmission, Mr. Boden explained.

With a tendency in heavy-duty axle construction to obtain low ratios with single reductions, Mr. Boden said that considerable trouble has been experienced when attempts have been made to make reductions more than approximately 6:1. In attempting to limit the ring-gear size, the diameter of the pinion and the number of teeth become quite small, with consequent high tooth loading, he pointed out. The diameter of the shaft also is governed by the pinion size, he went on, and in many cases the shaft is weakened still further by the tooth-cutters removing metal at the bearing supports. Even though the bearings are adequate for the imposed loads, the deflection of the shaft itself, especially on overhung mountings, becomes excessive, and no bearing can compensate for the lack of pinion rigidity, he contended.

Mr. Boden added that the use of hypoid gears offers a means of increasing pinion shaft stiffness because, for a given ratio and ring-gear size, the pinion is increased considerably in diameter with consequent increase in pinion shaft size. It would appear that a good solution to the lower ratios for single-reduction axles would lie in the use of hypoid gears, because of the increased pinion stiffness and increased fatigue resistance of the pinion teeth, he concluded. Adequate bearing sizes should be used because of the increased bearing loads, he reminded.

Discussing Mr. Boden's paper, L. A. Bixby, Clark Equipment Co., said that good engineering dictates that the design of a transmission or axle shall be such as to limit deflections to an amount that is satisfactory for the service in which the unit is to be subjected. Care should be exercised, he pointed out, to provide a uniformity of deflection in the case and not allow a portion to have great rigidity and then permit some other section to deflect excessively. He advocated keeping the design as short and compact as possible.

E. F. Brunner, Goodyear Tire & Rubber Co., spoke on the cushioning qualities of pneumatic tires, which first were applied to farm tractors as original equipment in 1932. He said that pneumatic tires without doubt relieve the chassis of many shock loads formerly transmitted through a solid tire. He presented results of elaborate tests on solid, cushion and pneumatic tires with the idea of determining the shock load, or impact, on roads. The tests were made by the U. S. Bureau of Public Roads in cooperation with the Rubber Manufacturers Association.

Louis Jacobi, Allis-Chalmers Mfg. Co., agreed with Mr. Boden that it is more economical to renew certain parts than to design them so they have a fatigue life equal to that of the whole machine, but he contended that the rule cannot be applied to tractor transmissions because, if a gear goes out, or a shaft, it is usually disastrous to the whole transmission. Mr. Jacobi gave an interesting demonstration of means employed by his company in neutralizing the effects of deflection of a piston rod in a large Allis-Chalmers engine operating on blast-furnace gas.

B. W. Keese, Wisconsin Axle Co., commented that, although many believe that measures in corrective designing to the limit or *control deflections* are expensive, it is often surprising how the increase to heavier shafts and more rigid housings actually reduces costs by permitting the use of not only smaller gears, but the choice of smaller bearings.

Thomas Barish, Marlin Rockwell Corp., contributed that all of the deflections pointed out by Mr. Boden are harmful only in disturbing the uniformity of tooth loading.

Prevention of Engine Wear

The symposium on engine wear, comprising the concluding technical session, was described as "the most valuable contribution to the literature and thought on the subject that any tractor meeting of the Society has ever developed." The symposium was directed by John S. Erskine, session chairman. The subject was introduced by A. T. Colwell, Thompson Products, Inc., in a paper dealing with valves and valve gear. He announced that his discussion was to be on the effects and the correction of wear, rather than its causes, which are well known through the literature on the point. In the tractor field, he said, valve and guide wear occur, often to an alarming degree. This wear probably causes many

(*Continued on page* 37)

Your Society — The Council

(*Continued from page* 22)

of the Council represents a quorum, so that an occasional lapse does not hold up the business of the Society. Nevertheless, a councilor can be removed from office upon failure to attend for a period of six months. Probably a total of one month out of the year would amply cover the average time consumed by Council membership, but the president can assign its members to special committees and when that is done the burden is increased.

What a councilor contributes to the Society as a whole is his judgment. He is able and valuable to the extent that his vision encompasses the Society as a whole and capable in so far as he can weigh the particular in its relation to the broader need. His decisions must come out of the past and carry forth into the future because that is what gives sustained growth to the Society and all its parts.

New Members Qualified

These applicants who have qualified for admission to the Society have been welcomed into membership between March 15, 1938, and April 15, 1938.

The various grades of membership are indicated by: (M) Member; (A) Associate Member; (J) Junior; (Aff.) Affiliate Member; (SM) Service Member; (FM) Foreign Member.

Baltimore Section

MAGUIRE, WILLIAM F. (A) sales manager, General Motors Truck & Coach, Sterrett Operating Service Div., 600 S. Caroline St., Baltimore, Md. (mail) 2610 Elkader Road.

STACHNICK, MARTIN C. (A) foreman, Baltimore Transit Co., Court Square Bldg., Baltimore, Md. (mail) 3023 Woodside Ave., Hamilton Post Office, Parkville, Md.

Buffalo Section

MAGRUM, GERVASE M. (M) assistant chief production and chief experimental engineer, Houde Engrg. Corp., 537 E. Delavan Ave., Buffalo, N. Y. (mail) 53 Minnesota Ave.

Chicago Section

BANKER, OSCAR HENRY (M) vice-president, New Products Corp., 1322 S. Wabash Ave., Chicago, Ill.

BOHLE, FRED (M) mechanical engineer, Illinois Tool Works, 2501 N. Keeler Ave., Chicago, Ill. (mail) Route 1, Box 171, Des Plaines, Ill.

DAVIS, WALLACE H. (A) superintendent of garage, Village of Winnetka, 510 Greenbay Road, Winnetka, Ill.

KUHLMAN, DOUGLAS J. (A) Chicago branch manager, Heil Co., 3000 W. Montana St., Milwaukee, Wis. (mail) Canterbury Court Apt., 1220 W. State Parkway, Chicago, Ill.

MITCHELL, JOHN (M) manager, Alloy Bureau, Carnegie Illinois Steel Corp., 208 S. LaSalle St., Chicago, Ill. (mail) 11519 S. Bell Ave.

SNYDER, ARTHUR C. (J) automotive tester, Universal Oil Products Co., Riverside, Ill.

STEFFENS, GEORGE A. (J) automotive tester, Universal Oil Products Co., Riverside, Ill.

TABBERT, R. M. (M) research engineer, Universal Oil Products Co., Riverside, Ill.

WOOD, WILLIAM A. (M) production manager, Aetna Ball Bearing Mfg. Co., 4600 Schubert Ave., Chicago, Ill.

Cleveland Section

EDWARDS, HERBERT C. (M) chief engineer, Timken Roller Bearing Co., Fuel Injector Equipment Div., Canton, Ohio. (mail) 720 16th St., N.E., Massillon, Ohio.

LUETKEMEYER, HENRY W. (A) mechanical engineer, research, Cleveland Graphite Bronze Co., 880 E. 72nd St., Cleveland, Ohio.

ROBERTSON, SAMUEL BROWN (M) president, B. F. Goodrich Co., 500 S. Main St., Akron, Ohio.

SLONEKER, L. B. (A) special representative, tractor and farm implement tire trade sales for U. S., Firestone Tire & Rubber Co., Firestone Park, Akron, Ohio. (mail) 532 Sunset View Drive.

STAUFFER, WILLIAM A. (A) assistant to sales manager, office manager, Lubri-Zol Corp., Box 3057, Euclid Station, Cleveland, Ohio. (mail) Rural Route 1, Mentor, Ohio.

THOREN, THEODORE R. (M) engineer, Thompson Products, Inc., 2196 Clarkwood Road, Cleveland, Ohio. (mail) 3315 E. 149th St.

Dayton Section

HARTMAN, GEORGE LEROY (J) draftsman, Superior Body Co., Lima, Ohio. (mail) 941 Richie Ave.

WEBB, HERBERT H. (A) assistant to vice-president, Dayton Power & Light Co., Gas & Electric Bldg., Dayton, Ohio.

Detroit Section

ALDRICH, JOHN G., JR., (M) designer, Hudson Motor Car Co., Detroit, Mich. (mail) 1001 E. Jefferson Ave.

ARLEN, FRANK (A) sales engineer, Universal Equipment Co., 1310 Oakman Blvd., Detroit, Mich. (mail) 14528 Ashton Road.

BLEGVAD, VIGGO MARSTRAND (J) 3565 Roland Drive, Birmingham, Mich.

BOLT, JAY A. (J) instructor, mechanical engineering, University of Michigan, 209 W. Engrg. Annex, Ann Arbor, Mich.

BRADLEY, DAN T. (M) chief engineer, Harris Products Co., 5408 Commonwealth Ave., Detroit, Mich. (mail) P. O. Box D, Grand River Station.

BUKOFF, PETER (J) engineer, Barkley-Grow Aircraft Corp., 13210 French Road, Detroit, Mich. (mail) 22605 13 Mile Road, St. Clair Shores, Mich.

CARMICK, LOUIS GRANDIN, JR., (A) head, Patent Dept., Evans Products Co., 15410 Fullerton Ave., Detroit, Mich. (mail) 13587 Roselawn Ave.

CENZER, CARL W. (M) body engineer, Hudson Motor Car Co., Detroit, Mich. (mail) 16212 Snowden St.

CHERIEZ, CHARLES Y. (J) body draftsman, Hudson Motor Car Co., 12601 E. Jefferson Ave., Detroit, Mich. (mail) 6114 Newport Ave.

CUSACK, WALTER M. (A) district sales manager, American Chain Div., American Chain & Cable Co., 12-252 General Motors Bldg., Detroit, Mich.

EVERS, LUDGER H. (M) body draftsman, Fisher Body Corp., Engine Plant 27, Detroit, Mich. (mail) 16930 Mendota Ave.

KLINE, JOHN E. G. (M) chief engineer, Micromatic Hone Corp., Detroit, Mich. (mail) 75 Beaupre Road, Grosse Pointe Farms, Mich.

KOEBEL, CHARLES J. (A) president, Koebel Diamond Tool Co., 1200 Oakman Blvd., Detroit, Mich.

LOWE, WILLIAM WALLACE (A) field engineer, Bendix-Westinghouse Automotive Air Brake Co., 8-212 General Motors Bldg., Detroit, Mich.

MCCANN, JOHN H. (A) branch manager, Crane Co., 150 Randolph St., Detroit, Mich.

MCINTYRE, W. D. (A) vice-president, treasurer, Monroe Auto Equipment Co., E. First St., Monroe, Mich.

MIDDLEWOOD, ROBERT W. (M) engineer in charge, Stinson Aircraft Corp., Wayne, Mich.

MOSBY, J. ROBERT (A) sales manager, Cook Paint & Varnish Co., 3301 Bourke, Detroit, Mich.

NYQUIST, GEORGE M. (M) body engineer, supervisor, design, drafting, experimental body work, Divco Twin Truck Co., 12801 E. Jefferson, Detroit, Mich. (mail) 5053 Bishop Road.

PHELPS, A. W. (M) general manager, Saginaw Steering Gear Div., General Motors Corp., 512 N. Hamilton St., Saginaw, Mich.

SCHULTZ, HARRY G. (M) plant manager, Murray Corp. of America, Ecorse, Mich. (mail) 2492 22nd St., Wyandotte, Mich.

SELJE, FREDERIC A. (M) director, interior art and body design, Chrysler Corp., Detroit, Mich. (mail) 286 Rivard Blvd., Grosse Pointe, Mich.

SHURTS, WILBUR F. (J) experimental engineer, transmissions, Chrysler Corp., 12800 Oakland Ave., Highland Park, Mich. (mail) 111 Highland Ave.

VYVYAN, WESLEY W. (J) draftsman, Pontiac Motor Div., General Motors Corp., Pontiac, Mich. (mail) 38 Claremont Place.

WALKER, THEODORE F. (J) chassis draftsman, Pontiac Motor Div., General Motors Corp., Pontiac, Mich. (mail) 574 W. Huron St.

WHITELAW, C. H. (A) vice-president, Cook Paint & Varnish Co., 3301 Bourke Ave., Detroit, Mich.

Indiana Section

ORR, PALMER (M) research engineer, Warner Gear Div., Borg-Warner Corp., Muncie, Ind. (mail) 201 E. Sixth St.

Kansas City Section

COLLINS, MERRITT E. (M) laboratory manager, Ethyl Gasoline Corp., 1917 Buchanan St., North Kansas City, Mo.

Metropolitan Section

BELSKY, JACK (A) inspector, Brooklyn Bus Corp., 994 Third Ave., Brooklyn, N. Y. (mail) 693 Saratoga Ave.

BURSTEIN, ADOLPH (J) stress analyst, Seversky Aircraft Corp., Farmingdale, L. I., N. Y. (mail) 17 W. 125th St., New York City.

CLARK, WM. H. (A) president, Alox Corp., 70 Pine St., New York City.

DELEHANTY, KENNETH C. (A) director, Vocational Div., Delehanty Institute, 11 E. 16th St., New York City.

GREEN, DANIEL H. (M) service manager, National Carbon Co., Inc., 30 E. 42nd St., New York City. (mail) 8 McBride Ave., White Plains, N. Y.

HUESTED, RICHARD SALISBURY (A) service engineer, Wright Aeronautical Corp., Paterson, N. J. (mail) 8 Westervelt Ave., Tenafly, N. J.

KENDALL, GEORGE H. (M) service engineer, Norma-Hoffmann Bearings Corp., Stamford, Conn.(mail) Edgerton St., Noroton Heights, Conn.

L'ALLEMAND, GEORGE W., JR. (J) design engineer, Hegeman-MacCormack Corp., 420 Lexington Ave., New York City (mail) 8530 112th St., Richmond Hill, L. I., N. Y.

MALKIN, GABRIEL (J) automotive engineer, Socony-Vacuum Oil Co., 412 Greenpoint Ave., Brooklyn, N. Y. (mail) 912 Avenue S.

PETRUZZI, CLAUDE E. (J) 98 Pondfield Road, W., Bronxville, N. Y.

REILLY, JAMES E. (J) clerk, J. P. Stevens & Co., Inc., 44 Leonard St., New York City. (mail) 186 Bowers St., Jersey City, N. J.

Milwaukee Section

BARKER, ORRIN W. (M) development engineer, Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee, Wis.

New England Section

BARTON, RANDALL (J) Granite St., Foxboro, Mass.

BOGREN, NEAL E. (A) president, Waltham Automotive Corp., Waltham, Mass. (mail) 215 Lexington St.

HALL, EMERY L. (J) engineer, Petroleum Heat & Power Co., 194 Sixth St., Cambridge, Mass. (mail) 1038 Massachusetts Ave.

Northern California Section

CAUDEL, FRED H. (J) research engineer, Shell Oil Co., Martinez, Calif. (mail) 1330 Warren St.

GAYLORD, JOHN L. (A) garage foreman, Market Street Railway Co., 58 Sutter St., San Francisco, Calif. (mail) 285 Douglas St.

MARTIN, FRED L. (A) foreman, mechanic, Luckenbach S. S. Co., San Francisco, Calif. (mail) 3140 21st St.

Northwest Section

TOMAN, PHIL F. (A) division lubrication engineer, General Petroleum Corp. of Calif.,

Dexter Horton Bldg., 710 Second Ave., Seattle, Wash.

Philadelphia Section

SUTHERLAND, FRANK B. (M) assistant manager, Automotive transportation, Atlantic Refining Co., 260 S. Broad St., Philadelphia, Pa. (mail) 110 N. Lincoln Ave., Wenonah, N. J.

St. Louis Section

ROSS, MICHAEL J. (A) 1304 Hillside Ave., Normandy, Mo.

Southern California Section

BRAY, ULRIC B. (M) assistant manager, research, Union Oil Co. of California, P. O. Box 758, Wilmington, Calif.

DAY, DAVID E. (M) assistant to vice-president, Richfield Oil Corp., 555 S. Flower St., Los Angeles, Calif.

DEBOER, FRED L. (J) draftsman, Radial Engine Dept., MacClatchie Mfg. Co. of Calif., Alameda Blvd. & Euclid St., P. O. Box 430, Compton, Calif. (mail) 926 W. Ninth St., San Pedro, Calif.

FRASER, ALEXANDER GEO. (M) assistant manager, Machinery Dept., Republic Supply Co. of Calif., 2122 E. Seventh St., Los Angeles, Calif.

Southern New England Section

BEGG, ROSS HUNTER, JR. (J) test engineer, Pratt & Whitney Aircraft Div., United Aircraft Corp., 400 Main St., East Hartford, Conn. (mail) River Road, South Glastonbury, Conn.

BROWN, DONALD LAMONT (M) president, United Aircraft Corp., East Hartford, Conn.

STATE OF CONNECTICUT, Highway Dept. (Departmental) 165 Capitol Ave., Hartford, Conn. Representative: Donnelly, Albert L., business manager.

Syracuse Section

EVANS, JOHN H. (M) chief engineer, Rollway Bearing Co., Inc., 541 Seymour St., Syracuse, N. Y.

Washington Section

EARLE, C. E. (S M) senior chemical engineer, U. S. Navy, Bureau of Aeronautics, Navy Department, Washington, D. C.

Foreign

BALL, THOMAS (J) assistant engineer, Shell Mex & B. P., Ltd., W. C. 2, London, England (mail) 36 Willoughby Rd., Hampstead, London N. W. 3, England.

CARO, RAMON (A) president, general manager, Ramcar, Inc., P. O. Box 291, Manila, P. I.

LAKE, CROMPTON JOHN (F M) director, Lake & Elliott, Ltd., Braintree, Essex, England (mail) High Cedars, Bocking End.

LOXTON, SAMUEL HARRY (F M) chief assistant engineer, Birmingham & Midland Motor Omnibus Co., Ltd., Omnibus Garage, Bearwood Road, Birmingham, England (mail) Rosemary Hill Road, Little Aston, Sutton Coldfield, Warwickshire, England.

SHILTON, WILLIAM ERIC (F M) chief, Technical Dept., Ferodo, Ltd., Chapel-en-le-Frith, Via Stockport, England.

SISMAN, ERIC WILSON (F M) research engineer, British Belting & Asbestos, Scandinavia Mills, Cleckheaton, Yorks, England.

WESLAKE, HENRY (F M) research engineer, Weslake & Co., Ltd., Fuller's Way, Kingston By-Pass, Surbiton, Surrey, England (mail) 25 Westleigh Ave., Putney Hill, S. W. 15, London, England.

Outside of Section Territory

ELLERBE, S. E. (A) test and sales engineer, Sinclair Refining Co., Box 1710, Atlanta, Ga. (mail) Box 2111, Birmingham, Ala.

GOULDTHORPE, HUBERT W. (M) mechanical design, General Electric Co., E. Lake Road, Erie, Pa.

JOHNSON, PAUL C. (A) vice-president, sales, Sealed Power Corp., 500 Sandford St., Muskegon Heights, Mich.

LEE, LAURENCE W. (A) assistant manager, Dowell, Inc., Midland, Mich.

MAGILL, SAMUEL B. (A) lubrication engineer, Hyvis Oils, Inc., Warren, Pa.

RICKENBACH, A. W. (M) charge of engineering department, Lycoming Mfg. Co., Williamsport, Pa. (mail) 1207 High St.

Applications Received

The applications for membership received between March 15, 1938, and April 15, 1938, are listed herewith. The members of the Society are urged to send any pertinent information with regard to those listed which the Council should have for consideration prior to their election. It is requested that such communications from members be sent promptly.

Buffalo Section

HOWE, WINTHROP K., chief engineer, General Railway Signal Co., Rochester, N. Y.

Canadian Section

JAMES, CLARKSON W., consulting engineer, Canadian Car & Foundry Co., Ltd., Montreal, Que., Canada.

YOUNG, BRUCE WOLFE, advertising manager, Collins & Aikman of Canada, Ltd., Toronto, Ont., Canada.

PETERS, ABRAM, automotive maintenance, National Motors, Ltd., Toronto, Ont., Canada.

Chicago Section

BEHNKE, ELMER R., supervisor of automotive operation and maintenance, Marshall Field & Co., Chicago, Ill.

BRYANT, EDWIN E., sales engineer, Burgess Battery Co., Chicago, Ill.

CANANN, WILLIAM CRAWFORD, district manager, Chicago, Bendix-Westinghouse Automotive Air Brake Co., Chicago, Ill.

DAVIES, WILFRED W., project engineer, United Air Lines Transport Corp., Chicago, Ill.

DAWES, DANA M., petroleum research, Pure Oil Co., Chicago, Ill.

DULYN, FRANCIS WINTHROP, apprentice engineer, United Air Lines Transport Corp., Chicago, Ill.

KOBZINA, JOHN O., JR., engine tester, International Harvester Co., Chicago, Ill.

LONG, LEWIS T., junior engineer, United Air Lines Transport Corp., Chicago, Ill.

MCMULLAN, ORIN W., metallurgist, Youngstown Steel & Tube Co., E. Chicago, Ind.

MEZERA, ERVIN F., tester, International Harvester Co., Chicago, Ill.

MOULTON, ROLLIN H., JR., apprentice engineer, United Air Lines Transport Corp., Chicago, Ill.

SMYTHE, WILLIAM H., JR., salesman, Nieburger Chevrolet Co., Chicago, Ill.

WHITLOCK, MARVIN, engineer, American Airlines, Inc., Chicago, Ill.

Cleveland Section

BORCHIK, ALBERT S., garage foreman, Ohio Bell Telephone Co., Cleveland, O.

CAMPBELL, ALBERT F., sales engineer, Timken Roller Bearing Co., Canton, O.

STEPHENS, WILLIAM T., vice-president and sales manager, Hydraulic Equipment Co., Cleveland, O.

Detroit Section

CHAPMAN, RICHARD D., student engineer, Chrysler Engineering Division, Highland Park, Mich.

DAVIDSON, STUART E., mechanical engineer, Bower Roller Bearing Co., Detroit, Mich.

HUTCHINSON, JOHN M. S., Dodge Bros. Corp., Detroit, Mich.

MCLEAN, JOHN S., correspondent, American Steel & Wire Co., Detroit, Mich.

SCHWENN, ERIC H., 1812 S. Genesee Drive, Lansing, Mich.

SIBLEY, BRACE H., engineering department, Champion Spark Plug Co., Toledo, O.

Indiana Section

BRINKWORTH, GEORGE LESLIE, sales, Aluminum Co. of America, Indianapolis, Ind.

GRUMME, FRED J., east division maintenance superintendent, Aero. Mayflower Transit Co., Indianapolis, Ind.

Kansas City Section

KIMSEY, WILLIAM A., chief engineer, Bearwin Airplanes, Engine Division, Kansas City, Kansas.

Metropolitan Section

FOSS, ERNEST L., administrator, General Motors Corp., New York City.

FRENCH, HARRY B., combustion engineer, Gulf Oil Corp., New York City.

HOGAN, ROBERT W., field representative, Ethyl Gasoline Corp., New York City.

MILLER, ALBERT E., process chemist, Sinclair Refining Co., New York City.

MILLER, ARTHUR DALE, junior engineer, Ethyl Gasoline Corp., New York City.

RICHARDSON, RODGER W., head of lubricants division, Standard Oil Development Co., Elizabeth, N. J.

SIPILA, LAURI JOHANNES, student, U. S. Diesel Engineering School, Boston, Mass.

STANTAN, CLAUDE EARL, Burns Automotive Parts, Inc., Haverhill, Mass.

Philadelphia Section

BERNARD, HARRY, engineer, Mack Mfg. Corp., Allentown, Pa.

SCHROEFFEL, JOHN B., automotive engineer, Socony-Vacuum Oil Co., Inc., Philadelphia, Pa.

Southern California Section

ITEN, FRED, JR., Auto Centre Garage, Los Angeles, Calif.

Southern New England Section

GRICIUS, JOSEPH, JR., oiler, Yacht Vanda, Thomas Shipyard, New London, Conn.

VERNIER, MARCEL GEORGE, test inspector, Pratt & Whitney Aircraft Engine, E. Hartford, Conn.

Outside Section Territory

CORNELL, SIDNEY, gear engineer, Fellows Gear Shaper Co., Springfield, Vermont.

DOW, GEORGE V., junior engineer, John Deere Tractor Co., Waterloo, Iowa.

JAMISON, WILLIAM EDWARD, instructor, Provincial Institute of Technology and Art, Calgary, Alberta, Canada.

JOHNSON, JAY DEE, junior engineer, John Deere Tractor Co., Waterloo, Iowa.

ROOP, FRANK S., JR., instructor, mechanical

engineering, Virginia Polytechnic Institute, Blacksburg, Va.

SAUR, HELMUTH OTTOMAR, engineer, Cities Service Oil Co., Fort Worth, Texas.

SLATER, E. J., general superintendent, Champlin Refining Co., Enid, Okla.

STITT, WILLIAM T., junior engineer, Pan American Airways, Brownsville, Texas.

WACHS, MILLER ALLEN, analytical engineer, Aviation Mfg., Lycoming Division, Williamsport, Pa.

WHITSON, DAVID J., service manager, Universal Motor Co., Ltd., Honolulu, Hawaii.

Foreign

AMOTT, OSWALD THOMAS, automotive engineer, Vacuum Oil Co. Pty., Ltd., Brisbane, Australia.

DACCO, A. A., general manager, S. A. Impresa Forniture Industriali, Milan, Italy.

IVANOV, ALEXANDER S., chief engineer, Autozwod im. Molotova, U. S. S. R.

JUNG, ERNST, Reventlowstr 40, Hamburg-Othmarschen, Germany.

RIX, JOHN ROBERT, automobile designer, Austin Motor Co., Ltd., Birmingham, England.

International Forum Proceedings Available

An American edition of the Proceedings of the General Discussion on Lubrication and Lubricants, an international forum sponsored by the Institution of Mechanical Engineers in London last October, will soon be available. The American edition, which will be an exact duplication of the English publication, is being published early this month by the American Society of Mechanical Engineers. The price will be $6.50.

Included in the Proceedings are 79 papers presented at the forum by leading engineers throughout the world. More than 20 SAE members in this country and foreign countries prepared papers for the Discussion.

Aircraft Engineering Conference Postponed

The National Advisory Committee for Aeronautics has announced that the Aircraft Engineering Research Conference, usually held in May at the Committee's laboratories at Langley Field, Va., has been postponed for one year.

This is because of a program, upon which the Committee has embarked with the approval of Congress, to construct new research equipment including four new wind tunnels, additional shop facilities, and improvement of existing research equipment.

About Authors

(*Continued from page 11*)

Johns Hopkins University in 1917. After service in France with the Corps of Engineers, he was employed by Black & Decker as experimental engineer. In 1919 he joined the Staff of the School of Engineering at Hopkins and is now in charge of the civil engineering department. Since 1920 he has served the United States Bureau of Public Roads as Highway Research Specialist, and has conducted numerous research projects for that Bureau in the field of structures, and highway economics. He is the author of approximately 20 reports in the fields indicated. In 1930 he was appointed Manager of the Sixth International Road Congress which was held in Washington, D. C., that year.

Installed Abroad

SAE extreme-pressure lubricants testing machines have been installed in laboratories of companies in England, Canada, Germany and Holland, according to a report listing the location of the 45 machines which have been produced to date.

In this country they have been purchased by organizations in 11 states.

Some Membership Data

A recent study of applications made by the Society's membership department has revealed that in 1937 and so far this year, approximately 20 per cent have been received from executives and chief engineers of the industry.

Ninety-one applicants were admitted to membership in the Society between March 15 and April 15.

SAE *Coming* EVENTS

Summer Meeting

June 12-17

White Sulphur Springs, W. Va.
The Greenbrier

(See page 19)

National Aircraft Production Meeting

Oct. 13-15 **Los Angeles**
Ambassador Hotel

Annual Dinner

Nov. 14 **New York City**
Commodore Hotel

National Production Meeting

Nov. 30 & Dec. 1 **Milwaukee, Wis.**

Annual Meeting

Jan. 9-13, 1939 **Detroit, Mich**

Baltimore – May 11

Camp Holabird, Maryland; luncheon 1:00 P.M., followed by inspection and demonstration of military motor equipment. This will be a joint meeting with the Washington Section.

Canadian – May 20

Genosha Hotel, Oshawa; dinner 7:00 P.M. H. G. Weaver, in charge of customers' research, General Motors Corp., will address the meeting.

Chicago – May 20

Municipal Airport. Inspection trip at 4:00 P.M., dinner 6:45 P.M., with meeting following. The session will consist of a symposium on aeronautic subjects.

Cleveland – May 20

Portage Country Club, Akron. Annual Akron meeting with general sports program in the afternoon and dinner and entertainment in the evening.

Dayton – May 9

Dayton Country Club; dinner 6:00 P.M. Industrial Plant Mobilization for the Next War.

Detroit – May 9 and 23

May 9 – Hotel Statler; meeting 8:00 P.M. Engine Testing Procedure – Prof. W. E. Lay, University of Michigan.

May 23 – Hotel Statler; dinner 6:30 P.M.

Indiana – May 26

Antlers Hotel, Indianapolis; dinner 6:30 P.M. Annual Speedway Race Meeting and Dinner.

Kansas City – May 6

Hotel Kansas Citian; meeting 8:00 P.M. Debate between the engineering students of the University of Kansas and Kansas State College. Subject – Resolved That the Compression Ignition Type Engine Is More Desirable Than the Spark Ignition Type Engine for Automotive Equipment.

Metropolitan – May 16

Downtown Athletic Club; New York City; dinner 6:30 P.M. Annual Spring Party. Speaker – Dr. J. O. Perrine, American Telephone and Telegraph Co.

New England – May 10

Engineers Club, Boston; dinner 6:30 P.M. Plant visit in the afternoon and maintenance session in the evening.

Northern California – May 10

Athens Athletic Club, Oakland; dinner 6:30 P.M. Visual Acuity – Prof. H. F. Blum, University of California. Roadway illumination – Prof. L. M. K. Boelter, University of California, assisted by Frank Ryder and D. D. Davis.

Oregon – May 13

Oregon State College, Corvallis, Ore. Presentation of student paper awards.

Philadelphia – May 11

Rittenhouse Hotel; dinner 6:30 P.M. The speaker at the dinner will be Don Rose, columnist for the Philadelphia *Public Ledger*, and he will talk on the Used Car Problem. The "SAE Follies," with 12 acts of local talent, will follow Mr. Rose's address.

Pittsburgh – No Meeting

Southern California – May 13

Hollywood Athletic Club, Los Angeles; dinner 6:30 P.M. The Cathode Ray Oscillograph in the Study of Combustion – G. M. Wheeler, research engineer, Tidewater Associated Oil Co. Aninol – a New Auxiliary Fuel for Maximum Power in Aircraft and Automobile Engines – Charles F. Lienesch, technical representative, Union Oil Co. of California.

Southern New England – May 4

Bond Hotel, Hartford, Conn.; dinner 6:30 P.M. Latest Developments in Die Casting – W. M. Peirce, assistant chief research engineer, New Jersey Zinc Co.

St. Louis – May 20

Coronado Hotel; dinner 6:30 P.M.

Syracuse – No Meeting

Washington – May 11

Joint meeting with Baltimore Section at Camp Holabird, Maryland. Luncheon 1:00 P.M., followed by inspection and demonstration of military motor equipment.

About SAE Members:

Adiel Y. Dodge, formerly consulting engineer, Bendix Products Corp., South Bend, Ind., has joined the Borg-Warner Corp., Chicago, as development engineer.

Prescott C. Ritchie, advertising manager of the Waukesha Motor Co., Waukesha, Wis.,

P. C. Ritchie
Elected

has been elected president of the Waukesha Association of Commerce.

William G. Piwonka has been appointed superintendent of buildings and equipment of the Cleveland Railway Co. Under his direction an extensive modernization of the rolling stock is being planned, including considerable replacement of street cars with motor buses and trackless trolley cars. Mr. Piwonka, who was previously equipment engineer with the company, is active in the Society's Cleveland Section. He was secretary for two years and is now SAE JOURNAL field editor for the Section.

Albert S. Menasco, president, Menasco Manufacturing Co., Los Angeles, is recuperating from a broken fibula. According to *Aviation,* his shin bone was cracked while demonstrating the approved tackling stance for Bill, his football-minded son.

James T. Sullivan, automobile editor of the *Boston Globe* and SAE JOURNAL field editor for the New England Section, has been elected president of the Charitable Irish Society of Boston. The Society is the oldest Irish organization in the United States. Its 201st anniversary was celebrated on St. Patrick's Day.

SAE Men on Metal Program

During the week of March 21, Los Angeles was host to three meetings in which members of the SAE participated. These were the Western Metal Congress, the western regional conference of the American Welding Society, and the 1938 spring meeting of the American Society of Mechanical Engineers.

Harry W. McQuaid, Republic Steel Corp.; L. F. Scherer, Texas Pipe Line Co.; Arthur W. Winston, Dow Chemical Co.; A. E. Raymond, Douglas Aircraft Co., Inc.; J. D. Armour, Union Drawn Steel Co.; E. K. Smith, Electro Metallurgical Co., and F. J. Walls, International Nickel Co., were SAE men on the program of the Western Metal Congress.

T. B. Jefferson, United States Engineer Department, presented a paper at the A.W.S. meeting.

SAE members on the A.S.T.M. program included: L. M. K. Boelter, University of California; Prof. C. H. Paxton, University of California at Los Angeles; Wendell Mason, University of California at Los Angeles, and C. G. A. Rosen, Caterpillar Tractor Co.

Orville Wright was honored at Henry Ford's Greenfield Village on April 16, by the dedication of the newly restored group of Wright buildings. The celebration was also a memorial to his brother, Wilbur, who died in 1912. Included in the addition to the village is the Wright home and the bicycle shop in which the brothers built the first successful airplane.

A. H. LauFer, chairman of the Northern California Section, has resigned from the Marvel Carburetor Sales Co., San Francisco, and has taken a position with Automotive Service, Inc., of the same city. He will represent them in Northern California.

W. E. Arthur, formerly associated with the McLellan Steel Construction Co., Los Angeles, is now located in New York as manager of Hegeman-Harris Co., Inc.

Myron S. Huckle, former chairman of the New England Section, has been chosen by Commissioner of Education James G. Reardon to deliver lectures in the Massachusetts University Extension Courses on Diesel motors. Mr. Huckle is president of the U. S. Diesel Corp., Boston.

M. S. Huckle
Lectures on Diesels

Bureau for Street Traffic Research Established at Yale

The Bureau for Street Traffic Research, of which *Miller McClintock* is director and *Maxwell N. Halsey* is assistant director, will carry forward its work, from now on, under the auspices of Yale University.

More extensive facilities for the work of the Bureau, which has been the leading agency in traffic research for nearly fifteen years, will be available at Yale.

Until recently the Bureau functioned under the auspices of Harvard University.

Maj. George E. A. Hallett was the Society's official representative at the inauguration of Alfred Atkinson as president of the University of Arizona, at Tucson, April 12.

Major Hallett recently resigned from General Motors Research Laboratory where he was, for a number of years, department head in charge of Diesel and other advanced engine developments, and moved to Tucson to recuperate his health, which, he reports, is improving.

Emerson Frantz has been named general sales manager by the Bohn Aluminum and Brass Corp., with which he has been affiliated since its formation. Since 1933 he has been manager of the bearing division in complete charge of production and engineering.

Frank A. Sharpe, for the past 20 years Detroit representative of the Thermoid Co., has resigned from that organization. At a later date announcement of his future activities will be made.

E. F. Tomlinson, formerly in the Akron sales organization of B. F. Goodrich Co., has been transferred to the Chicago manufacturers' sales division in charge of farm implement tire sales.

C. W. Wacker, with Goodrich since 1912 in various sales capacities, becomes manufacturers' sales representative in the Detroit district. Prior to this change he was western manager of the Goodrich national accounts division, with headquarters in Chicago.

Rhode Gets Wright Brothers Medal

Richard V. Rhode, engineer with the National Advisory Committee for Aeronautics, Langley Field, Va., (*right*) was awarded the Wright Brothers Medal by the Society, April 12, at an aircraft meeting sponsored by the Metropolitan Section at the Alexander Hamilton Hotel, Paterson, N. J.

Dr. Stephen J. Zand, consulting engineer, Sperry Gyroscope Co., Inc., Brooklyn, (*left*) a member of the award committee and Wright Brothers Medalist in 1931, made the presentation. This was the ninth awarding of the Medal.

The Medal, given annually by the Society for the best technical paper on aerodynamics, structural theory, or research for airplane design or construction, was presented to Mr. Rhode for his paper on "Gust Loads on Airplanes" which was presented at the Annual Meeting of the Society, Jan. 14, 1937, in Detroit. The paper was published in the SAE JOURNAL, March, 1937, pp. 81-88.

. . . . At Home and Abroad

Clemens C. Persily, formerly fleet sales specialist on trucks, Chevrolet Motor Division of General Motors Sales Corp., New York, has joined the General Truck Sales and Service Co., New York, as district truck sales representative.

Herbert Hosking, editor of *Automotive Industries,* has been appointed official delegate to represent the Society at the ceremonies to be held in connection with the dedication of the Franklin Institute of the State of Pennsylvania in honor of Benjamin Franklin, and the unveiling of an heroic statue of this distinguished American. The ceremonies will be held in Philadelphia, May 19, 20 and 21.

Charles W. Phelps has established an office as consulting engineer at 75 East Jackson Blvd., Chicago.

Prof. J. C. Hunsaker, Massachusetts Institute of Technology, is secretary of the Fifth International Congress for Applied Mechanics, to take place at Harvard University and the Massachusetts Institute of Technology, Sept. 12-16, 1938.

A. P. Buquor, assistant to the president, Martin-Parry Corp., York, Pa., is making his headquarters in Washington, D. C., being in charge of the company's office in that city.

Donald E. Whitehead, formerly service engineer, Shell Petroleum Corp., Toledo, Ohio, is now affiliated with the Tide Water Oil Co., Newark, N. J.

Henry Ford and Mrs. Ford celebrated the fiftieth anniversary of their wedding on April 11.

Winfree A. Horne has entered the United States Army Air Corps and is stationed at Randolph Field, Tex., as a flying cadet. He was previously employed by the California Packing Corp., Emeryville, Calif.

Hoy Stevens, process engineer, Cleveland Railway Co., is completing his work on a Masters Degree at Western Reserve University this semester.

Management Congress

William L. Batt, president, SKF Industries, Inc., is chairman of the coordinating committee for the seventh International Management Congress to be held in Washington, D. C., Sept. 19-23. The American affiliate of the International Committee of Scientific Management, which is sponsor of the Congress, is the American Management Association.

SAE members serving on the American Congress Council include: Charles F. Kettering, vice-president, research laboratories division, General Motors Corp.; Paul W. Litchfield, president, Goodyear Tire & Rubber Co.; James D. Mooney, president, General Motors Export Co., and Alfred P. Sloan, Jr., chairman, General Motors Corp.

Ralph E. Flanders, president, Jones & Lamson Machine Co., is chairman of the committee on production.

Robert H. Daisley and *W. H. Wallace* have been made vice-presidents of the Eaton Manufacturing Co. Mr. Daisley is manager of the Wilcox-Rich division and Mr. Wallace is manager of the spring division at Detroit. Both men have been with the company sixteen years.

E. W. Isom, vice-president, Sinclair Refining Co., New York, has been appointed chairman of the 1938 Automotive Survey Committee of the American Petroleum Institute. R. P. Anderson, secretary of the Institute's Division of Refining, is secretary.

E. B. Hill has been made manager of the Chicago branch of Gar Wood Industries, Inc. He formerly was manager of the New York branch at Long Island City.

Ernest M. Roeber, formerly draftsman with the Godfrey Manufacturing Co., New Brunswick, N. J., has taken a similar position with Wright Aeronautical Corp., Paterson, N. J.

Maj. E. E. Aldrin
Consultant

Maj. E. E. Aldrin resigned as aviation manager for the Standard Oil Development Co., as of March 31, to enter into independent aeronautical consulting work. He is being retained in this capacity by the Standard Oil Co. Upon his return from a trip abroad Major Aldrin will establish a New York office. Ten years ago Major Aldrin resigned from the Regular Air Corps to join Standard Oil as aviation manager.

W. H. Bushkin recently was appointed regional service manager for the Chrysler Motors Service Division in the Seattle, Wash., region. He was previously service merchandising manager in the Los Angeles region.

Dr. Gustav Egloff, Universal Oil Products Co., spoke before the Engineering Society of Detroit on "Modern Gasolines and Lubricating Oils" at its March 22 meeting held on the University of Buffalo Campus. The meeting was sponsored by the Western New York Section of the American Chemical Society.

Edward Otto Grabow, Jr., has joined the truck division of International Harvester Co., Utica, N. Y., as sales engineer. He was previously with Carrier Air Conditioning, Syracuse.

Hoffman Receives Safety Award

Paul G. Hoffman, president of the Studebaker Corp., received the C.I.T. Safety Foundation's grand award of $5,000 for leadership in traffic safety during 1937 at a dinner held in New York, March 23.

Other awards included the Foundation's bronze plaque for the best institutional motion picture on the subject of traffic safety made during 1937. It went to B. E. Hutchinson, chairman of the board of Plymouth Motor Corp., for that company's film, "The Chance to Lose."

C. C. Carlton has been named vice-president of the Motor Wheel Corp., Lansing, Mich. Prior to this advancement he was secretary of the company. Mr. Carlton was recently re-

C. C. Carlton
Named Vice-President

elected president of the Automotive Parts and Equipment Manufacturers' Association.

James E. De Long, president of the Waukesha Motor Co., Waukesha, Wis., recently returned from a two-months' tour of Europe. While abroad he studied business conditions in Germany, France, England, Belgium and Sweden.

Eugene Laas, formerly junior mechanical engineer, U. S. Army Ordnance Department, Wilmington, Del., is now draftsman at the U. S. Naval Engineering Experiment Station, internal combustion engineering laboratory, Annapolis, Md.

Stephen Johnson, Jr., has been appointed general engineer of the Bendix-Westinghouse Automotive Air Brake Co., Pittsburgh, Pa. Previously Mr. Johnson was chief engineer. He is a past-chairman of the Pittsburgh Section and, last year, was SAE vice-president representing Truck, Bus and Railcar Engineering.

Laurence E. Crooks, consultant, Northampton, Mass., lectured to students at Smith College, April 12, on "What It Takes to be a Safe Driver," and, April 26, on "Good and Bad Driving Practices."

Roy H. Smith, formerly executive vice-president of the Lamson & Sessions Co., Cleveland, has been elected president of that com-

R. H. Smith

G. S. Case, Sr.

pany to succeed *George S. Case, Sr.,* who was elected board chairman to fill the vacancy created by the death of John G. Jennings. Mr. Case has been president since 1929.

F. K. Glynn, American Telephone & Telegraph Co., spoke before senior mechanical engineering students at the Syracuse University College of Applied Science on March 28.

Forest L. Mason, head of automotive department, Quincy Trade School, Quincy, Mass., is conducting a series of eight lectures on "What Every Woman Should Know About an Automobile to Avoid Repair Bills" at the Boston Teachers College.

News of the Society

Reasons for Flight Testing Told by Baker

● **So. New England**

"We are getting away from the idea of taking up a plane 'just to see what it will do,'" Paul S. Baker, senior test pilot, Chance Vought Division of United Aircraft Corp., stated in addressing the April 6 meeting of the Southern New England Section on "Engineering Flight Testing." "We have a pretty good idea in advance, and testing becomes to a large degree checking our predictions against data obtained from the test," he added.

Flight testing is also becoming more of an exact science, and also an exacting one, the speaker pointed out.

There is now increasing desire and demand for actual measurements according to definite criteria, of all characteristics of aircraft, Mr. Baker said.

Testing is done for three major reasons, the speaker stated, designating them as checking a plane or some part of it for specific requirements imposed upon it by customer or designer, examining the potentialities of some experimental innovation, and securing data for the design of future aircraft.

The testing is done under four departments, Mr. Baker said, including checking on performance, flying qualities, structural strength and operational qualities.

Under the heading of performance, maximum speed, rate of climb, stalling and cruising possibilities are all examined. The flying qualities of a plane, he said, are under the subdivisions of stability, or the characteristic of returning to normal flight when disturbed therefrom, spin characteristics, handling traits and controllability.

Structural tests, including diving and recovery, are the most "spectacular," Mr. Baker told his hearers.

The unusual method of obtaining recorded data on meter readings during dives and recovery was illustrated by Mr. Baker. A 16 mm. motion picture camera is focused on the instrument board, and the instruments are photographed in motion, allowing the pilot to give all his attention to handling the plane. One such film was run off.

The technical session was preceded by a dinner.

True Inventions Rare, Says Professor Kirsten

● **Northwest**

The University of Washington's Engineering Department was host to the Northwest Section on March 4.

Members and guests gathered at the University Commons for dinner, following which Prof. F. K. Kirsten delivered an informal address and led a discussion on the subject of "Inventions." The speaker also described the theory and operation of the University's new wind tunnel, one of the most modern in the country. Due to the great current consumption of the motors driving the propellers, the tunnel is not operated after dark, so the members were not able to see it in operation.

In speaking of inventions, Prof. Kirsten contended that very rarely is a true "invention" made; rather, he said, a series of improvements and developments along any particular line results finally in a practical, usable product. It was in this manner, he said, that practically all of our present-day machines and processes were developed.

Horine Analyzes Truck Performance Problem

● **Philadelphia**

Members and guests of the Philadelphia Section concentrated their attention on truck performance at the Section's April 13 meeting. M. C. Horine, sales promotion manager, Mack Mfg. Corp., presented a paper on the subject. He was introduced by J. Wallace Fager, secretary of the Philadelphia Chapter of the Pennsylvania Motor Truck Association, who was chairman of the session.

Opening his paper with the statement, "A problem well analyzed is half solved," Mr. Horine proceeded to a detailed discussion of truck performance which he labeled as ". . . one of highway transport's most pressing problems.

"The significance of performance at this time," said the speaker, "arises from several considerations, the foremost of which is the strong probability that, in the near future, legislation, either National or State or both, will be enacted, or regulations adopted, requiring certain minimum performance ability of commercial vehicles, either as a prerequisite to registration, or as a requirement in operation."

While the trend toward regulation seems far from being crystallized in definite form, it appears probable that it will be either by formula, prescribing a certain relationship between cubic inches of piston displacement and permissible maximum gross vehicle weight; limitation of tire equipment, according to piston displacement; type testing and rating of various models of various makes, or the development of instrumentation for actual road tests, he stated.

Mr. Horine opined that any formula which may be developed for the rating of motor-vehicle performance should fulfill the following requirements: (1) that it shall be soundly based upon the facts in so far as they may be determinable, and not upon traditional theory; (2) that it shall be simple, both in the final coefficient of performance which it yields and in its forms of expression, and shall be divested of all needless complication of intricacies of calculation; (3) that it shall be flexible, so that in the future when changes in prevailing conditions or present mechanical limitations shall occur, the formula may be adapted to such changes by the simple process of altering the constants currently applicable while preserving the essential form and principle of the expression; (4) that it shall employ as factors in its equation only such quantities and measures as are unequivocal, readily ascertainable, and subject to positive verification; (5) and finally, that it shall constitute nothing more than a yardstick for measurement, accurate within commercial and practical limits, but in itself incapable of constituting standards of practice or of being incorporated into law or regulation.

Oil Filters Discussed

The Philadelphia Section's meeting for March featured a triple bill, including addresses by C. W. Spicer, president of the Society, John A. C. Warner, general manager, and an exceptional technical paper by James I. Clower, of the Virginia Polytechnic Institute, who made the trip to Philadelphia especially to present new research material on the application of oil filters.

Giving his personal belief that the oil filter is subject to more controversy than any other automobile accessory, Professor Clower attributed the wide divergency of opinion to incorrect selection of filters and careless installation.

Factors to be considered in selection of a filter for a fleet or a single vehicle were set forth by the speaker as filter performance, filter capacity with respect to engine size, life of filter element, first and maintenance costs, ease of servicing and installation, constructional details, likelihood of element disintegrating and unloading into the crankcase oil, suitability and reliability of fittings, proper location and size of restricting orifice, and type of constructional materials.

Flow rate through the filter was singled out as especially important by Professor Clower who, in this connection, said, "I do not believe that the necessity for and size of orifice should be a matter for decision by an operator or filter manufacturer, but should be a recommendation made by the engine builder, who is in the best position to know the quantity of oil that

Field Editors

Baltimore – Espy W. H. Williams
Buffalo – G. W. Miller
Canadian – Warren B. Hastings
Chicago – Austin W. Stromberg
Cleveland – William G. Piwonka
Dayton – R. H. Henry
Detroit – William F. Sherman
Indiana – Harlow Hyde
Kansas City – No Appointment
Metropolitan – Leslie Peat
Milwaukee – Theodore L. Swansen
New England – J. T. Sullivan
No. California – C. W. Spring
Northwest – R. J. Hutchinson
Oregon – Sid Hammond
Philadelphia – H. E. Blank, Jr.
Pittsburgh – Murray Fahnestock
St. Louis – C. T. Schaefer
So. California – W. G. Chamberlin
So. New England – F. W. Mesinger
Syracuse – C. T. Doman
Washington – Capt. E. L. Cummings

can be safely bypassed from the oiling system."

For testing oil filters three procedures were named as essential: (1) one to assimilate low-temperature service; (2) one to assimilate high-temperature service; and (3) one to assimilate intermediate-temperature service. In instances when it is known that the vehicle in question will not be operated over the full range of temperature conditions, one or even two of these procedures can obviously be dispensed with.

"I am of the opinion," said Professor Clower, "that no single filtering medium used at present possesses properties sufficiently universal as to effect an acceptable performance over the full scale of operating conditions. It is for this reason that I believe it is necessary to employ three test procedures." Since some mediums are most effective at higher temperatures than others and vice versa, the speaker suggested that it might be practicable for filter manufacturers to provide two cartridges, designating them as summer and winter, or high-temperature and low-temperature cartridges.

"I do not believe," he added, "that under any circumstances should filter tests be made by employing crankcase drainings from vehicles not equipped with filters and circulating this through the filter for a predetermined period of time, or until the filter clogs. Filters should be judged on their ability to maintain oil in good condition, and not on their ability to clean up dirty oil, nor on their capacity to absorb dirt."

Tells Advantages of Barrel-Type Engine

● Detroit

Adequate materials, efficient lubricants and production accuracy must be obtained to make possible the use of the revolver-barrel type engines, it was stated March 14 at an engine design session of the Detroit Section.

K. L. Herrmann, consulting engineer of South Bend, Ind., who has been affiliated with Studebaker, Briscoe and Bantam Ball Bearing Co., and is a past vice-president of the Society, told of his experiments with the barrel-type engine and exhibited a complete unit and various parts. Since 700 or 800 barrel engine patents are on file, the engine is not basically new, but Mr. Herrmann discussed a design that is simplified and has shown considerable promise in tests. If this new engine is successful, he said, numerous advantages will accrue.

"There are no connecting rods or bearings, no camshaft or timing gears, practically no main bearings, and no crankshaft," he declared. The crankshaft, he explained, is replaced by a straight shaft running in two plain bushings with a very simple cam; adding that these parts weigh half and cost less than half of the part replaced.

"The pistons are in balance; their motion is harmonic," Mr. Herrmann declared. "They operate against a rigid cam. Because of this there are no torsional vibrations and there is no unbalance due to connecting rod angularity. Of course, no counterweights are necessary." He said that the barrel engine size is less than half the conventional types, costs half as much, requires only half as much space, and that less than one-third the usual production equipment is required to build it.

His own critic, Mr. Herrmann declared that the model he has built is difficult to install in motor cars because the bell housing and transmission mounting require unconventional treatment.

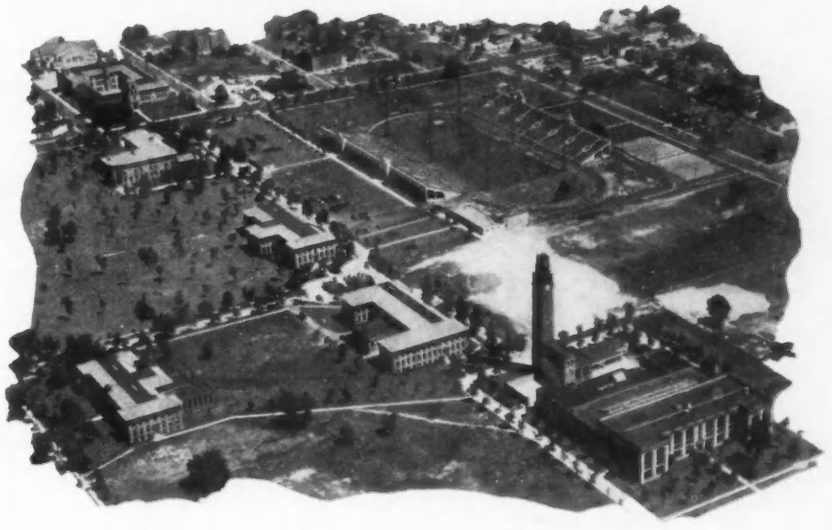
"Engine torque is twice that of the conventional gasoline engine, thereby requiring different transmission, clutch, etc. This, however, is obviously an advantage for aircraft," he declared.

He also reported difficulty in silencing valve tappets and stated that extreme-pressure lubricants seem necessary because of roller speed variation. Bottom cylinders, he said, must be shielded against excessive oil. The conventional water pump has proved unsatisfactory. During tests frequent piston breakage has been incurred with damage usually so complete that the cause could not be determined. However, he said, it was decided later that the piston design was too weak, that the cylinder afforded insufficient piston support and that improper lubrication had caused seizure. The main cam warped in hardening and at first it was not ground, Mr. Herrmann declared.

Besides this, he said, the cam follower bearing crowded the bushing retainer and lock

S·A·E Student Branches

UNIVERSITY OF DETROIT



Data Supplied by Edward J. Foley, SAE Student Branch Chairman at the University of Detroit.

THIS month a group of students and alumni is celebrating the tenth anniversary of the founding of the SAE Student Branch at the University of Detroit. Fourth oldest Student Branch, it is one of the largest.

On the campus it is active in the affairs of the College of Engineering, often arranging joint meetings with other professional societies. Each year it participates in the University's display at the Detroit and Michigan Exposition – known as the Michigan World Fair – and takes a prominent part in arranging the College's unique Slide-Rule Dinner. This is the big affair of the year and each engineering society invites a prominent man in its industry to be its guest. Past SAE President Harry T. Woolson; V. P. Rumely, past chairman of the Detroit Section, and R. N. Janeway, nominee for the Detroit Section chairmanship next year, have been guests of the Branch on these occasions.

Each year the Branch holds two big get-togethers, one at the beginning of each term, to which nonmembers are invited. At this time a moving picture depicting some phase of the industry is shown and a prominent member of the Society stresses the advantages of student enrollment and of SAE membership after graduation. Other meetings are varied throughout the year so that all members will profit regardless of what their major subjects may be.

Off the campus, members of the Branch regularly attend meetings of the Detroit SAE Section, often continuing discussion of the papers they hear at the next meeting of the Student Branch.

During the Annual SAE Meeting in January classes were dismissed so that students in mechanical and aeronautical engineering could attend the sessions.

The Branch whole-heartedly subscribes to the purposes of the U. of D. Engineering College, which are: first, to give such a college education as will prepare for a career and for professional standing in the field of engineering; second, to pre-

(*Continued on page 35*)

spring out of position. Another difficulty incurred is that of keeping the engine clean, he added.

Frank E. Watts, chief engineer, Hupp Motor Car Corp., said that in spite of the success so far with standard metals and standard finish, he believes that new metal and improved finishes are required. Compactness and light weight offered by the barrel engine are going to make this type very much used some time in the future, he said.

Sees Field for Engine

"I certainly think that these small compact and light weight engines are going to make the present type of engines obsolete for certain types of work – some types of airplane work and some kinds of boat work and rear engine construction," Mr. Watts asserted.

Another commentator pointed to the possibility of "Brinelling" of the cam plate or failure of the rollers to accelerate and decelerate at the speed required, due to their inertia. Mr. Herrmann declared that these parts had to change velocity from 14,000 to 18,000 r.p.m. at close intervals. He is looking forward to the possibility that some special treatment of steel may be necessary if the "Brinelling" or wear problem becomes serious.

It was urged that the patents still in effect be brought together to provide further development of the barrel engine under a single license without hampering restrictions.

C. V. Crockett, Cadillac Motor Car Co., speaking on the design of the new Cadillac V-16 engine, placed emphasis on the evolution of the engine and the thinking behind the design rather than upon the details of the final production.

The new engine, he said, follows the trend to the "square engine design" with bore and stroke both 3¼ in. The engine is unusually compact, being about as long as the average 250 cu. in. straight eight, despite its displacement of 431 cu. in. Complete powerplant weight, including clutch and all accessories, is only 2.47 lb. per cu. in., he said. Fuel consumption is exceptionally good, he declared, giving better economy than an eight-cylinder engine in the same manufacturer's line.

While the car weighs 5400 lb., it has a high-gear acceleration of from 10 to 25 m.p.h. in 4.8 sec. and from 10 to 60 m.p.h. in about 16 sec. A discusser, impressed by these acceleration figures, said that his organization has performance figures on about fifteen 1937 models of various makes. The average acceleration permitted a speed increase of from 10 to 60 m.p.h. in 23.6 sec., while the best car accomplished this in 18 sec.; giving the Cadillac V-16 an outstanding position in the light of this performance, he added.

Stresses Importance of Trained Tune-Up Men

● Oregon

The most important equipment necessary for a shop to turn out proper motor tune-up jobs is the personnel, was one of the startling opinions expressed by E. A. Marks, owner of Marks' Electric Service, in his paper on "Motor Tune-Up" presented before the April 8 meeting of the Oregon Section at the Imperial Hotel, Portland.

The program was opened with an illustrated talk on the operation and servicing of Bendix hydraulic and vacuum booster brakes by C. H. Horn, technical service representative of the Bendix Corp. Mr. Horn stressed importance of checking numerous details of braking systems to assure proper action, and gave the members several tips on where to find braking troubles and how to correct them.

Mr. Marks pointed out that very few mechanics have knowledge of the basic laws of mathematics, physics and chemistry which are incorporated in the present-day motor. Without some knowledge of this type, he contended, all the fine equipment in the world will not make him a good tune-up man.

A recounting of the tune-up procedure followed in his shop, colored with several stories of actual experiences, made up the balance of Mr. Marks' paper. An interesting fact brought out in the discussion that followed was the statement by Mr. Marks that several of his customers have cars driven more than 50,000 miles without valve grind jobs and that are still developing practically the same power output that they did when new. It is his contention that valves never need grinding if the motor is properly cared for.

At the meeting which preceded the program, William Paul, Oregon State College, reported on activities of the Student Branch on the campus at Corvallis. Mr. Paul thanked Oregon Section members for the meeting which they put on at the college on the night of March 31, and assured the members that the several campus meetings being planned for next year will greatly assist in maintaining a strong Student Branch.

Friday luncheon trips are being planned for this spring through the plants of American Can Co., Willamette-Hyster Co., Pacific Telephone and Telegraph Co. and the Bradley Tractor Co. An inspection of one of the City of Portland's fireboats is also being arranged by J. Verne Savage.

Industry Will Never Be Static, Says Spicer

● New England

Presenting an optimistic outlook for general business, especially the automotive industry, founded upon transportation which today is more of a necessity than ever, SAE President C. W. Spicer addressed the New England Section at its March 17 meeting. With him on the program was John A. C. Warner, the Society's secretary and general manager. The guest speakers were introduced by John H. Walsh, chairman of the Section.

Mr. Spicer explained that in these days when things must be moved in a fraction of the time needed a generation ago, much depends upon the motor-vehicle. That is why the industry will never be static, he declared.

He amplified the point by stating the varied phases of transportation included in the organized activities of the SAE. Then he indicated the opportunities of expansion in these fields. He also predicted closer cooperation between automotive and railroad engineers.

Mr. Spicer touched upon the business opportunities which lie ahead in the United States, which, with only seven per cent of the world's population, has 80 per cent of its motor-vehicles and 60 per cent of its telephone and telegraph facilities. He gave statistics on the nation's business and discussed briefly the essential soundness of the economic system which has established this nation as leader in so many fields.

Mr. Warner in his talk, "Truth Through Torture," told the story of what goes on behind the doors in laboratories and proving grounds – the industry's "torture chambers" – where raw materials, parts and finished vehicles are put through the most grueling tests to determine if "they can take it."

He told how this work, carried on behind the scenes, has contributed to the metamorphosis of the automobile from a lumbering toy that broke down upon the slightest provocation, to the smooth, rugged mechanism of today that continues to operate through the worst kinds of weather, over all kinds of roads, and on the steepest hills, despite the most flagrant abuse. Mr. Warner showed many slides which brought out the facts which were included in his talk.

Describes Armament Of Military Aircraft

● Cleveland

"American and Foreign Military and Commercial Aircraft" was the topic discussed before 214 members and guests of the Cleveland Section at the April 11 meeting, by R. V. Kerley, chief, fuel and oil testing unit, Power Plant Branch Materiel Division, Wright Field.

After a short introduction, Mr. Kerley remarked that his paper incorporates only published information assembled by himself, and that expressions of opinion are his own and not those of the Materiel Division.

Pursuit or fighter aircraft, he said, are intended to attack hostile aircraft in flight. In general, he remarked, this group consists of small, very fast aircraft capable of climbing to an altitude of 10,000 ft. in something less than 5 min., and capable of a top speed of 280 m.p.h. or more. Mr. Kerley explained that armament usually consists of two fixed machine guns synchronized to fire between the propeller blades. These guns may be of 0.20, 0.30, or 0.50 caliber although the 0.30 caliber guns are probably most popular at the present time, he pointed out, adding that the value of the use of smaller projectiles lies in the ability to fire these at a faster rate and to carry a greater number of them for the same weight. On the other hand, he explained, the larger projectiles do more damage when they strike and may be used effectively for greater ranges.

In speaking of attack airplanes, he said, "Attack, as a form of aerial warfare, can be summarized in these few words: Firing on and bombardment of terrestrial objectives from a low altitude." Attack aircraft normally are equipped with from four to six fixed machine guns mounted two on each side of the engine nacelle in the wings, possibly two in the engine nacelle synchronized with the propellers, and one or more flexible guns in the rear cockpit to aid in protecting the aircraft, he stated. In addition, the speaker continued, there is normally an ample supply of small bombs either under the wings or in the fuselage. Attack airplanes are normally powered by a single engine although two engines are being incorporated in some aircraft of this type, he said.

Observation Aircraft

Observation aircraft he spoke of as planes normally used for short range reconnaissance missions for the purpose of observing and reporting on the disposition and activities of hostile ground, air and naval forces. In addition they assist the artillery by locating suitable objectives and adjusting fire, and are liaison agents for the use of ground commanders. Armament, he said, normally consists only of the essential protective equipment included in which are a fixed gun in the engine nacelle synchronized with the propeller and a flexible gun in the observer's cockpit.

The obvious purpose of bombardment aircraft, Mr. Kerley declared, is the destruction of land or naval material objectives by means of bombs. When attacked by hostile aircraft the bomber must be able to protect itself either by fighting or by fleeing. Rather recent reports of the success of converted Douglas DC-2 transports used as bombers in Spain indicates that superior speed may be used to an advantage when the bomber is inherently unable to defend itself in other ways. Most European countries, he explained, have developed two different types of bombers, a larger, slower type capable of carrying heavy loads and aptly termed "Night Bombers" and a smaller, exceedingly fast type termed "Day Bombers." In this country there has been a recent tendency to develop bombers of increasingly great size capable of relatively high speeds and long ranges and ex-

ceedingly well protected by machine guns, he stated.

Mr. Kerley defined the purpose of cargo and passenger transports in military use as the transportation of supplies to operating airdromes or the high speed transportation of command, staff and other trained personnel. Since such aircraft are not greatly different in general to commercial aircraft only one cargo transport has been included, and that only because of its highly experimental nature, he stated.

Military seaplanes and flying boats, he said, are designed to operate from and over water and are used for the dual purpose of observing the location and maneuvers of enemy fleets and naval objectives, and, in most instances, for attacking these objectives by bombardment. Range and useful load is often considered of more importance than great speed, he remarked.

Another interesting fact developed by the speaker is that within the next year much may be expected to be heard concerning some of the following aircraft as contenders in an international race for regular passenger service across the Atlantic. He listed as some of the possible contenders for this service, the Short Brothers' "Double Empire," the Boeing Model 314 "Super Clipper," the French C.A.M.S. 161, and, possibly, the Martin 156 which is being built for Russia.

During the discussion period, the relation of the powerplant to the aircraft was ably discussed by Arthur Nutt. P. B. Rogers, eastern representative, Douglas Aircraft Co., gave a short description of the Douglas factory and their product. J. F. Wallace, Cleveland Pneumatic Tool Co., discussed landing gears. He brought out the fact that the original pneumatic landing gear had to act only as a column, while struts and other supports took side thrust and torque. Now, however, the landing gear must act as a cantilever beam in addition to cushioning the vertical thrust, he declared; adding that the air now takes only the static load, the actual work of cushioning the impact being done by the hydraulic mechanism.

Halsey Urges Greater Traffic Efficiency

● **New England**

"Gratifying as Massachusetts' record is in winning the National Traffic Safety Contest we must look forward to the time when the State will win a similar award for traffic efficiency," Maxwell N. Halsey, of the Bureau for Street Traffic Research, said at the April Meeting of New England Section. Chairman John H. Walsh presided.

"Such efficiency," the speaker declared, "would allow Massachusetts' citizens to move on highways quickly and economically. Today on most main highways it is necessary for motorists to drive at 40, 50 or even 60 m.p.h. to average 30 m.p.h. Important as accidents are, they are only one index of traffic inefficiency. This is not a plea for high speeds but for average speeds to permit transporting passengers and goods by motor-vehicle more expeditiously.

"The answer to that cry is found in two principles of planning. The first is dispersion of traffic from city streets too narrow to stand the full impact of such traffic. The other is traffic concentration over a small number of arteries which appear expensive but can handle traffic at a considerably less cost. The Worcester and Newburyport turnpikes are excellent examples of the latter type of efficiency thoroughfare."

Mr. Halsey then declared that highway engineers must keep in mind that they are not designing roads for racing drivers, but for the man or woman of only average driving ability; and must take into account human characteristics that enter into driving.

Record Crowd Attends Aircraft Engine Meeting

● **Metropolitan**

The largest meeting in the history of Metropolitan Section was held April 12 at Paterson, N. J.

During the afternoon, more than 400 members and their guests inspected the testing laboratories and manufacturing plant of the Wright Aeronautical Corp., spending about an hour and a half on carefully planned and excellently organized trips with a competent guide for each group of from six to ten. Because much of the trip was through the experimental and development sections of the laboratories, only American citizens were permitted to make the inspections.

Dinner was served to more than 350 members and guests in the Alexander Hamilton Hotel. The formal presentation of the 1937 Wright Brothers Medal was made to Richard V. Rhode, engineer, National Advisory Committee for Aeronautics, by Stephen J. Zand, Sperry Gyroscope Co., Inc., who received the award in 1931. Dr. Zand is chairman of the 1938 Wright Brothers Medal Board of Award. S. G. Tilden, chairman of the Section, introduced Dr. Zand.

The technical meeting following the dinner was attended by an overflow crowd of more than 500.

A. W. Pope, Jr., research engineer, Waukesha Motor Co., described in detail the single-cylinder test engine. This, he explained, was developed by a volunteer group including representatives of lubrication refiners, aviation fuel experts, engine builders, spark-plug and other accessory manufacturers, and the National Bureau of Standards, in cooperation with the Waukesha Motor Co.

The engine, he pointed out, covers the requirements of a broad range of development and research work and provides, for the first time, a type of unit well suited to the strenuous test work required in the study of problems related to powerplants of high specific output.

A. L. Beall and L. M. Townsend, Wright Aeronautical Corp., explained the procedure

Visiting Wright Aeronautical Corp.

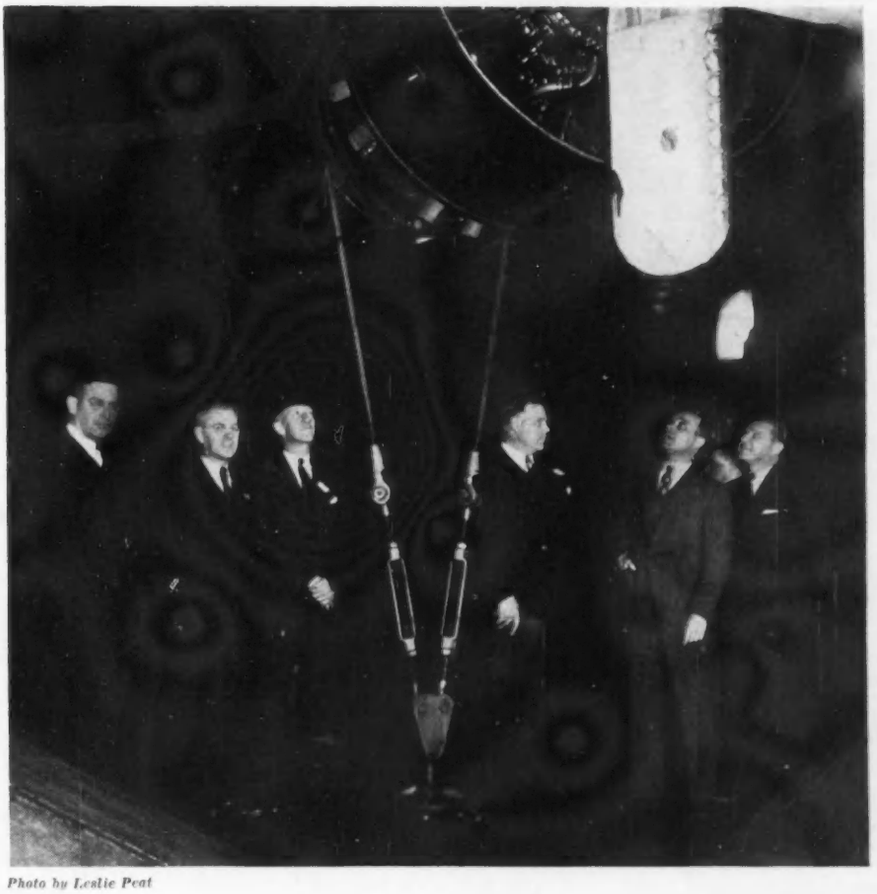


Photo by Leslie Peat

● **Metropolitan**

On April 12 more than four hundred members and guests of the Metropolitan Section visited the plant of the Wright Aeronautical Corp., Paterson, N. J.

In the picture, *from left*, are M. B. Gordon, vice-president and general manager of Wright Aeronautical Corp.; Arthur Nutt, Wright vice-president in charge of engineering; E. E. Husted, chairman of the Metropolitan Section's Meetings Committee; S. G. Tilden, chairman of the Section; John Steele, service engineer, Pan American Airways System; C. B. Veal, research manager, SAE; George Chapline, vice-president of sales, Wright Aeronautical Corp.

They are inspecting the new double-row Cyclone 14 which is rated at 1500 hp. for take-off and 1200 hp. for normal sea-level operation. Four of these engines are to be used in the transatlantic Clippers being built by Boeing for the Pan American Airways System.

used by their company in making spark-plug tests with the single-cylinder engine.

Because a new engine under development cannot be used to test engine accessories, they said, this work is done on the single-cylinder unit. The cylinder is the same size as those of the actual engine.

Actual operating conditions, the authors stated, are simulated and carefully controlled in the laboratory. They further explained that spark-plug designs and materials are exhaustively tested, and that periodically spark-plugs are removed for careful checking.

When a plug has passed the rigid tests it is then tested in the completed powerplant, they added.

Macy O. Teetor, Perfect Circle Co., described how piston-rings and cylinders wear. Using a synchronized moving picture, he showed how minute particles, broken from the rings and cylinders, act as abrasives, thus speeding wear.

He pointed out the necessity of careful selection of ring and cylinder materials, and stressed the importance of control of the structure of the metals in manufacture.

R. F. Gagg, assistant chief engineer of Wright, and Metropolitan Section vice-chairman for aeronautics, was in charge of the meeting.

Reports on Inspection Tour of Europe's Roads

● Canadian

The dinner meeting of the Canadian Section, held March 17 in Toronto, established a new high for a regular meeting of the Section in length, diversity and interest. Section Chairman W. E. McGraw, chief engineer, Chrysler Corp. of Canada, Ltd., who had just returned from a motor trip through Mexico, presided.

J. L. Stewart, past Section chairman and manager, Canadian Automobile Chamber of Commerce, was the host of the evening. The guest of honor speaker, R. M. Smith, deputy minister of highways for Ontario, was presented to the gathering by J. P. Bickell, registrar of motor vehicles for Ontario.

Mr. Smith graphically described the highway development in Europe and the British Isles as he saw it during his recently completed tour of inspection. He stated that to Belgium goes the credit of priority in the construction of dual-pavement highways. He spoke particularly of that which links Brussels with Antwerp.

Germany, he stated, leads in the mileage constructed of this now universally approved type of super highway. These hundred-mile-an-hour roads, he said, were obviously strategically designed and located for the rapid transport of troops. One travels them for distances of twenty miles or more, even close to cities, without encountering cross-over turning points or confluent intersections. They do not enter cities but bypass them and their urban approaches are by means of suburban ring roads.

To encourage the motorization of Germany, Hitler abolished registration fees, Mr. Smith said. Gasoline, however, is a virtual state monopoly, the cost being approximately twenty-two cents per gallon, while the retail selling price is forty-two cents per gallon. Generally, the Reichautobahns, with the exception of the raceway between Berlin and Potsdam, are unlike the Autostrada of Italy, in that they are toll free. Traffic on these new roads is but a small fraction of that on the old highways on which all local traffic is confined.

France, the speaker said, has built practically no roads of the new type. Many of the old cobble paved roads, however, have been resurfaced with asphalt, others have been converted, and so provide a much smoother surface than those that prevailed during the war years, by the simple expedient of inverting the worn cobbles.

The finest dual-pavement highways he saw anywhere were in England, the speaker said, where practically every mile of the 178,000 miles of highway system has been paved. The arterial highways are being carried by bypasses around cities, towns and villages. New construction generally is of the dual-pavement type and splendidly designed Clover Leaf grade separations have been and are being built.

According to Mr. Smith, Ontario, which has approximately 70 per cent of the paved roads of Canada, has launched its most ambitious road building program. Initial units have been completed in the construction of a dual-pavement trans-provincial highway from Windsor to the Quebec border and through the Niagara Peninsula.

Work, he reported, is progressing on the last link of the Trans-Canada highway between the "Soo" and Schreiber. During the past year, he added, more pavement had been laid in northern Ontario than in the preceding decade and the provincial government's program calls for the bringing of the new Ontario highway system up to the standard of the King's Highways of Southern Ontario as expeditiously as is consistent with efficiency and economy.

Concluding the program R. H. Combs, first chairman of the Section and president of the Prest-O-Lite Storage Battery Co., presented films showing the craters on the moon, a solar eclipse of Jupiter, and the constellation of Orion. Mr. Combs, who is recording secretary of the Royal Astronomical Society, gave a brief dissertation of the films.

Although the hour was already late the audience demanded more and Mr. Combs complied by showing color films of Mt. Shasta, the Canadian Rockies, the floral blaze of color in the gardens of Victoria, B. C., in March, and a series of sunset sequences taken from his summer home on Rice Lake, Ont.

Adopts Novel Method of Unearthing Talent

The Philadelphia Section has adopted a novel method of obtaining talent for entertainment periods at meetings. Not long ago members received the following notice:

"The program committee of your Section would like to take advantage of the hidden talents of the Section members at some meeting before this season ends. Will you, in the space provided, give us the low down on any member acquaintance who plays a musical instrument, sings, does parlor tricks or entertains in any way. Don't forget yourself."

On the return card the member is told, "Don't sign if you do not wish to – but give us the dope."

President Spicer Honored By Section and Students

● Indiana

The Indiana Section joined with the Purdue University Student Branch on April 12, holding a special meeting in honor of SAE President C. W. Spicer's visit to the Purdue campus.

Student Branch officers took charge of events. Open house was held in the afternoon and senior engineering students conducted the visitors on tours of the campus. The university's laboratories, where research projects and tests are under way; Purdue's R.O.T.C. armory, one of the first to have fully motorized artillery; and the school's airport were seen by most of the guests.

The meeting continued with a dinner session at which President Spicer spoke on "New Firing Lines for Engineers" emphasizing the dynamic nature of the automotive industry and forecasting continued opportunities for young men choosing to make it their career. He also called upon engineers to do their share in the work of citizenship. The Society's general manager, John A. C. Warner, visiting the campus with President Spicer, spoke on "Truth Through Torture," taking his listeners on a tour of testing laboratories and proving grounds, picturing the grueling tests raw materials, parts and finished vehicles must go through to prove that they can stand the abuse they will be put to on the road.

The guests were welcomed by Student Branch Chairman N. K. Reinhard and Prof. G. A. Young, head of the School of Mechanical Engineering. Other speakers were H. M. Jacklin, professor of automotive engineering, and K. D. Wood, professor of aeronautical engineering, who spoke of the work being carried on by students in their departments.

"The flying personnel of Wright Field has flown every day except Sunday, no matter what the weather, during the past two years, and has demonstrated that instrument flying is not only here to stay, but that it is being practiced under the most adverse weather conditions," Lieut. Benjamin S. Kelsey, U. S. A. Air Corps, Wright Field, told members of the Indiana Section at their March 17 meeting. Among the guests were delegates from the five Indianapolis airports; two of which are military fields.

Lieutenant Kelsey called attention to the fact that aviation is the only transportation industry that can operate full speed in conditions of severe fog and ice. Flying by instruments, he said, airliners and military planes thunder full speed ahead under weather conditions which slow and at times stop trains, anchor ships, and even force birds to walk.

In speaking of blind landing the speaker stated that perfect scores were made in 90 per cent of the instrument landings made by pilots of United Aircraft in San Francisco. He also noted that 746 completely blind landings were made at Wright Field in 1934.

The speaker recalled that the industry is only 34 years old and stated that much of its rapid progress is due to the scientific and engineering basis upon which it was established by the Wright Brothers. He also noted that the Wrights designed and used the world's first wind tunnel.

Three Speak at Truck, Bus and Railcar Meeting

● So. California

Six-wheel trucks, an automatic transmission and a modern streamline train were topics of the three papers which held interest of Southern California Section members at their Truck, Bus and Railcar Meeting, Feb. 11. John M. O'Malley, superintendent of equipment, California Department of Public Works, division of highways, was in the chair.

A. K. Brumbaugh opened the technical session with his paper on the weight distribution and transfer problem in six-wheel truck design. In prefacing his talk the speaker credited the Pacific Coast for originating the six-wheel design and mentioned that Ellis W. Templin, a member of the Section, worked on the design of six-wheel trucks as early as 1919.

Mr. Brumbaugh brought out the fact that the majority of truck operators have placed larger engines in their equipment, sometimes Diesels, hooked a trailer on behind and expect to be able to pour all the tremendous power required to operate such units through one differential drive pinion designed to carry much less load.

Unfortunately, Mr. Brumbaugh said, trucks are loaded until they feel right to the drive – no consideration being given the effect of such tremendous overloads on springs or any other part of the truck.

Through proper design and the use of vari-

ous types of torque arms, load transfers can be made to function uniformly on all six wheels under all operating conditions – thus minimizing localized loading and excessive tire wear, he said.

Mr. Brumbaugh's presentation was followed by a paper on automatic transmissions prepared by C. B. Lindsey, of the Los Angeles Railway Co., and presented by Mr. Rishel, shop foreman of the same company. Profusely illustrated with slides it covered the experience of local transportation companies with the automatic transmission. Mr. Lindsey mentioned the fact that the Los Angeles Railway and the Los Angeles Motor Coach Co. operate approximately 355 passenger coaches – twenty of which employ the Mono-Drive transmission designed and developed by Oscar Banker.

The use of this type of a transmission, Mr. Lindsey said, causes less driver fatigue and minimizes the frequency of broken drive shafts and axles. It was brought out during the discussion that many bus drivers through negligence or, in some instances, purposely shear off axle shafts and drive shafts by engaging the clutch too rapidly. The use of this transmission entirely eliminates the possibility of this action.

Entire control of transmission gearing is obtained through accelerator pedal manipulation. A small gear lever on the dash permits reverse operation, he explained.

A button is provided so that the transmission may be shifted from "high" back into "second" by merely releasing the accelerator and depressing this button which applies an airbrake to the planetary housing, permitting a throwout shoe to throw the transmission out of high by disengaging the planetary carrier from the output shaft, he stated. When the accelerator is again depressed, transmission is in second gear.

According to Mr. Lindsey, if the coach is allowed to coast, it will automatically release high and second gear and be in low when the coach stops, as when picking up passengers. Manual control, through the small lever on the dash, is only required when the operator desires to leave the coach or wishes to place it in reverse, he added.

Mr. Rishel followed the presentation of this paper with a series of slides that illustrated the internal design of this type of transmission.

Talks on Streamliners

A. L. Weinberg, vice-president of the Union Pacific Railway and head of their research department from Omaha, Neb., made a special trip to Los Angeles to present his paper on recent developments in streamline-train design.

In designing streamlined trains, he declared, safety was considered first, comfort second and speed third.

The new streamliners City of Los Angeles and City of San Francisco, are a joint development of Chicago, Northwestern, Southern Pacific and Union Pacific Railroads. There has been incorporated in the design of these trains the advances in the knowledge of the art gained from many thousands of miles of operation of this type of equipment by these railroads, the speaker said.

Mr. Weinberg listed the following in describing the train:

Seventeen units make up each of these trains, the leading three of which are power cars or locomotives. Immediately behind the three power cars are the day coaches, diner, kitchen, dormitory, club and Pullman sleeping cars.

The total weight of the train fully loaded, including locomotive, is approximately 1300 tons.

Lounge chairs, portable radio and telephone outlets, individual heating, cooling and ventilating controls, single and double bedrooms, roomets, duplex single bedrooms and open and closed sections are provided for passenger comfort and convenience.

Aluminum is used throughout the design of these cars except the end sills, needle beams and car-body bolsters which are of Corten alloy steel. All stress carrying framing castings are of alloy steel, heat treated.

The entire inside of the cars are insulated with at least three inches of Fibreglas insulation with paper on both sides. The inside metallic lining is insulated from the outside members with Bakelite impregnated canvas. Felt paper is used extensively for further protection.

All windows are of safety glass.

The spring system is a triple combination of long-travel alloy steel journal-box springs, short-travel intermediate bolster springs and elliptical main bolster springs.

Four brake cylinders per truck are used. Two are mounted on each side of the truck frame and operate the four shoes on the adjacent wheels.

Ten foot-candles of light are provided at the reading plane throughout the entire train. Some 3000 watts of light per car are used as compared with the 700 or 800 watts formerly thought sufficient.

Electric heat is provided in order to conserve boiler water, especially in severe weather.

The air-conditioning system is of the dual type. The system installed gives a minimum of 10 cu. ft. of fresh air per min. per person, and not less than 400 cu. ft. per min. total. Special air filters of high efficiency are provided in both the fresh air and re-circulated air intakes.

According to Mr. Weinberg, the train can be serviced in five minutes, taking on 225 gal. of fuel per min.

Symposium on Magnetic Testing Methods Held

● So. New England

Notwithstanding counter attractions, a large group of engineers attended the March 16 meeting of the Southern New England Section to do honor to the President of the Society, and its General Manager, John A. C. Warner. President C. W. Spicer addressed the gathering briefly with some well chosen words, leaving a message of considerable importance to the younger engineers.

The subject of the evening consisted of a symposium on magnetic testing of ferrous metals. Carl T. Hewitt, metallurgist, Fafnir Bearing Co., expounded on the method in which the piece to be tested forms part of the magnetic circuit and indicated that this method is applicable to uniform shaped pieces to be tested in comparatively large numbers.

James Allison, factory manager, Billings & Spencer, said his problems are of a different nature, and his method deals with the inspection and testing of lengths of bar stock of uniform section, and adopting the method in which the piece to be tested becomes the core of a transformer. In conjunction with this, the equipment of the Magnetic Analysis Corp. is used. Rapid testing of assorted lengths can be effected in an entirely satisfactory manner, he said.

Herbert J. Noble, metallurgist, Pratt & Whitney Division of United Aircraft Corp., de-

University of Detroit

(*Continued from page 31*)

pare especially for the industrial and administrative phases of engineering, and third, to develop men and citizens as well as engineers.

Modern buildings and the up-to-the-minute equipment in the mechanical and aeronautical engineering laboratories might give the impression that the university is a young one. Such is not the case. It began its educational work more than 60 years ago. In 1911, when it was incorporated as the University of Detroit, the College of Engineering was the first of the different colleges to be established.

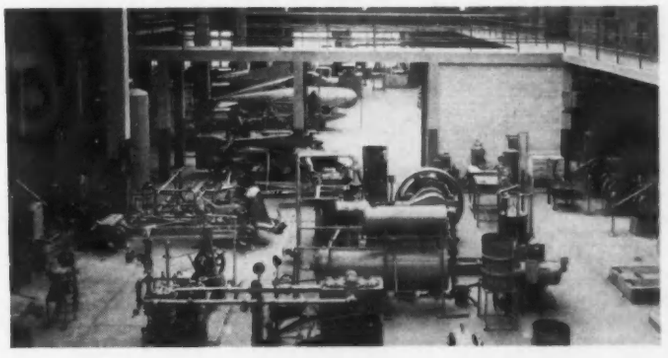
Most Branch members are enrolled in the mechanical and aeronautical engineering divisions of this College. They share the new uptown campus of the University, shown on page 31, with members of the Colleges of Arts and Sciences and of Commerce and Finance, the Graduate Division and the general administrative offices of the University. On the older downtown campus are the Schools of Law and of Dentistry, the Dental Clinic and the Evening Colleges of Law and of Commerce and Finance. Some 2800 students are enrolled in the University, of which 600 are in the College of Engineering.

Practical and theoretical training are combined under the cooperative plan of education successfully followed by the College of Engineering. On a four-week schedule students alternately attend classes at the University and do actual work in industrial plants or on construction jobs. Only members of the three upper classes of five-year courses leading to Bachelor degrees may participate in this scheme.

Students also take part in faculty-directed testing of equipment for industrial concerns in the University's laboratories.

The automotive industry has employed many of the students who have taken part in the cooperative program. Alumni of the College of Engineering may be found in any branch of the industry – administrative, engineering, production and sales, many of them SAE members whose first contact with the Society came through membership in the Student Branch. Accurate records are kept of the location as well as the progress of all alumni of the College.

Prof. George J. Higgins of the aeronautical department, past faculty moderator, and Ralph R. Johnson, industrial coordinator of the College of Engineering, present faculty moderator, have cooperated with officers of the Student Branch in arranging programs for meetings. Prof. Peter Altman, head of the aeronautical engineering department and a past-chairman of the Detroit Section, is also actively interested in the work of the Branch. All three men are SAE members.



University of Detroit General Engineering Laboratory

scribed still another method of magnetic testing, specifically applicable to his own problems. This involves the use of Magnaflux in which the parts to be inspected are first longitudinally or circularly magnetized, using a standard magnetizing unit. When properly magnetized, defects result in local flux leakage areas. Magnaflux powder, being of high magnetic permeability, offers a low reluctant path and, consequently, adheres along the lines of flux leakage. The resulting pattern tells the inspector the location, extent and character of the defect, he explained.

While all three of the speakers recognized the definite desirability of this method of testing, they all acknowledged its limitations. It was conceded that only surface flaws or close-to-the-surface flaws could be detected, with the present available equipment.

The ensuing discussion, if it did nothing more, uncovered a latent brand of humor unsuspected in John Lee, project engineer, Chance Vought Division of United Aircraft, whose description of their efforts to demagnetize an airplane in their factory proved highly amusing.

Terse and pertinent comments made by Professor DeForrest were greatly appreciated by the engineers present.

Approximately 75 attended the dinner, with the gathering swelling to over 200 for the evening's session.

Stresses Importance of Fleet Superintendent

● Syracuse

Everyday problems in operating a fleet of motor-vehicles were discussed by F. K. Glynn, American Telephone & Telegraph Co., at the March 28 meeting of the Syracuse Section. Attendance reached 130 at the technical session, following dinner at the Onondaga Hotel.

Throughout his paper Mr. Glynn stressed the importance of the fleet superintendent. He warned company executives that the services of a low-priced man in this capacity is false economy in practically every instance. "The value of an experienced, technically trained fleet superintendent who knows how to organize his forces and to sell an economy program to his executives and associates cannot be over-emphasized," he declared.

The job, duties and responsibilities of the average fleet superintendent, he said, includes: organization to operate a fleet; daily maintenance and general repair practices; selection or construction and location of garages and repair shops; compilation and use of operating data; measuring operating results; selection, replacement and productivity of vehicles; purchasing and driver training. Mr. Glynn outlined the scope of each of these duties – and stated that the fleet supervisor "must be an expert in each, plus having the ability to run his department so smoothly that all of the motor-vehicle using departments of his company will cooperate in accomplishing economical motor-vehicle operation."

Carburetor and Piston-Ring Papers Discussed

● Pittsburgh

Macy O. Teetor, in charge of research engineering, and Roy Paton, in charge of research laboratory, Perfect Circle Co., gave a coordinated talk and moving picture on "Reduction of Piston Ring and Cylinder Wear," and W. A. Gebhardt, research engineer of Bendix-Stromberg, presented "Recent Problems in Carburetor Development" to 181 keenly interested members and guests at the Pittsburgh Section's "double-feature" meeting April 11.

Lively discussion followed the papers and Dr. W. A. Gruse, of Mellon Institute, asked Mr. Teetor, whose paper was printed in the Transactions Section of the April SAE JOURNAL, p. 137, if he had found any confirmation of the hydro-dynamic theory of wedge lubrication in his work. Mr. Teetor replied that although there is plenty to the theory of wedge lubrication, his experiments indicate metal-to-metal contact. He also stated that it seems inconceivable that pressures should be balanced on front and back of piston rings because the rate of wear, from the top to the bottom of the cylinders, almost matches the indicator card, thus indicating that the pressure had spent its force as the piston descended.

Ralph Baggaley, Jr., McCrady-Rodgers Co., asked what led to the discovery and development of Ferrox. Mr. Teetor, in reply, told how they had been working on piston-ring scuffing and other problems and, having found the limitations of previously used materials, decided that a change in materials would be the best answer. Material surfaces which would reduce the rate of wear of new engines, and the conditions of first use of a new engine, are important factors in determining the rate of wear, he said. Since Diesel and aviation engines present more difficulties than automobile engines, he noted, solutions of their problems should be helpful in improving passenger-car engine performance.

Other prominent discussers of Mr. Teetor's paper included W. E. England, of American Bantam Car; B. H. Eaton, of Bell Telephone, and several guests.

Discussion of Mr. Gebhardt's paper by Ralph Baggaley brought up the question as to whether the fleet operator could rebuild the carburetors of trucks which had been in use for some time. Mr. Gebhardt answered that this could be done to advantage, provided the fleet operator knew what he was doing, and stated that such rebuilt carburetors would then give service fully equal to the performance of the other units of the truck. As a rule, he said, about 25,000 miles of service may cause sufficient wear of jets (due to dirt in gasoline) to make it worth while to replace jets. It would seem more logical, he added, to replace jets on a gallonage, rather than on a mileage basis.

Dr. W. A. Gruse asked the effect of maximum vacuum on carburetor efficiency and Mr. Gebhardt replied that this depends upon the design of the carburetor.

The effect of an oil-bath type of air cleaner on carburetor adjustments interested many fleet operators and it was said that, in general, the installation of an oil bath type of cleaner would increase the restriction (as compared with a gage type of air cleaner) and so, by increasing the vacuum, have the effect of increasing the jet size by about three sizes. The use of exhaust-gas analyzers, after the installation of the oil-bath type of air cleaners, was suggested as a practical means of determining the size of the jet required for use with the oil-bath type of air cleaner.

Australian Engineers Honor SAE Delegate

George W. Wolf, as official delegate of the SAE to the 1938 Automotive Engineering Convention of the Institution of Automotive Engineers, Australia, held in Sydney, March 7-12, was allotted highest place of honor, next to the Lord Mayor, at the Convention Banquet.

Responding to the visitors' toast, Mr. Wolf told a very attentive audience about the activities of the SAE and the value of membership to all engineers and technicians of allied trades engaged in the manufacture and maintenance of motor-vehicles.

Writing of the meeting, James Fielder, Australian member of the SAE Overseas Committee and the Society's local representative at the Convention, said of Mr. Wolf's talk, "I have never experienced anything like it in an after-dinner speech. We hope to see more of Mr. Wolf, and I expect to receive many inquiries for membership."

Mr. Wolf is assistant general manager of the General Motors Export Division, and Mr. Fielder is chief engineer of the National Roads and Motorists' Association, with headquarters in Sydney.

Requirements for Diesel Fuel Outlined by Rendel

● Washington

"The maternal parent of the Diesel engine was the need for a prime mover which could efficiently utilize the wide range of oils lying between naphtha and gasoline and the heavier residual oils such as road oil and asphalt," was the opening remark of T. B. Rendel, director, engine research laboratory, Shell Petroleum Corp., before the Washington Section on April 12.

Continuing, Mr. Rendel stated, "Of late, due to various economic and political reasons, not the least of which are the high taxes placed on gasoline, considerable impetus has been given to the development of engines of this class; indeed so rapid has been this development that the Diesel engine is now able to compete with what is perhaps the most highly developed form of prime mover in existence, the high-speed gasoline engine used for road transport.

"Now, new conditions call for new developments, and, as might be expected, the trend of development of the Diesel engine has been toward the use of higher speeds and higher power output per cubic inch of engine displacement. This is, I am convinced, a perfectly natural law, but to be successful, the Diesel engine must not forget its maternal parent and its digestion system must, as far as possible, be such that it will burn, cleanly and completely without objectionable exhaust smell, the majority of fuels lying within the range of gasoline and reasonably heavy residual oil. This problem becomes more and more important as development advances and the applications of the Diesel engine expand, since the higher speed engines are unavoidably more sensitive to abuse when made to digest unsuitable fuel, and the greater need for widespread distribution of Diesel fuel tends to raise its price nearer and nearer that of gasoline."

Attention was called to necessity for simplification in view of the multiplicity of existing fuel specifications. The two basic problems to consider in any fuel specifications were then stated as:

"First the problem of handling the fuel and dispatching it from the refiner's supply tanks to the final fuel valve which admits the fuel at the proper time and in the proper form of spray to the combustion chamber. The second problem is to supply a fuel at this valve which will burn completely in the combustion chamber without objectionable exhaust smell or leaving objectionable deposits which will eventually result in destroying the 'tune' or the mechanical adjustments of the engine, thus destroying its mechanical efficiency."

The speaker then discussed in detail such properties of the fuel under the first problem as its viscosity, pourpoint, and last, but by no means least, its cleanliness, and under the second problem as its ignition quality, sulphur content, viscosity, and volatility.

Mr. Rendel concluded his paper by summing up the whole question of fuel specifications in stating the following requirements:

"(1) Suitable viscosity limits to insure proper

handling of the fuel on its passage to the combustion chamber.

(2) Suitable pourpoint limits to insure that the engine's pumps can handle the fuel efficiently.

(3) Suitable limits for cleanliness as shown by specifications for bottom settlings and water, and ash content.

(4) Suitable limits for ignition quality to insure adequate control of the first stage of combustion.

(5) Suitable limits for volatility as expressed by the Conradson carbon number or other suitable volatility index to be developed."

Particularly vigorous and lengthy discussion was participated in by many of the members attending.

West Coast Truck Problems Analyzed

● No. California

The West Coast is an area definitely calling for a high percentage of special truck models, A. K. Brumbaugh, West Coast representative, Timken-Detroit Axle Co., stated at the March 8 meeting of the Northern California Section. The final negotiation, he added, is usually a combination of what the customer needs, what he wants, and what the vehicle manufacturer can supply him at a reasonable profit.

Turning to the question of road pressures, Mr. Brumbaugh spoke of the necessary elasticity of the truck frame and body, and the changeovers which have been made by means of six-wheel attachments to take full advantage of truck capacity without exceeding road pressure limitations. He deplored the fact that trucks are often loaded to absolute capacity on the level and then expected to operate over a hilly terrain. This, he declared, can only be done at a sacrifice of speed resulting in considerable congestion of traffic. A point often overlooked, he said, is the strain placed on gears by braking with the engine in hilly country.

Mr. Brumbaugh used numerous slides to illustrate points in his paper.

Section Chairman A. H. LauFer presided, and before introducing the speaker of the evening called upon G. L. Neely, Standard Oil Co. of California, to tell of his trip East which included the Annual Meeting in Detroit and a visit to the Society's headquarters in New York.

"Casey" Jones Talks to Students on Aviation

● N. Y. U.

"Aviation has come to a point where it must be run as a business enterprise," C. S. (Casey) Jones, president of the Casey Jones School of Aeronautics, told members of the student Branch at New York University on March 17. "It must make money," he said, "if it is destined to succeed." He stressed the need for new men in the industry.

For learning to fly, Mr. Jones believes that a small plane is the most satisfactory. After one has learned to fly the small plane is still good for pleasure flights and short trips, he said, adding that as one desires to "go places," he eventually will turn to a larger and more powerful ship.

In speaking of the growing number of instruments that require the pilot's attention, he said that, as a factor of safety, instruments should be developed that would combine the functions of two or more instruments; the whole idea being to cut down extra duties of the pilot. He spoke of the automatic pilot as the greatest aid in decreasing the work of the pilot.

Walter M. Hartung, chief instructor at the Casey Jones School and a graduate of New York University, was introduced, after which there was discussion, led by Professors Hamilton and Teichman of the N. Y. U. aeronautical school.

National Tractor Meeting

(Continued from page 24)

troubles for which it is not blamed, as definite complaints that valves wear out too fast are seldom available. It is known, however, he pointed out, that excessive clearance develops too quickly and operation is continued too long with this condition. Mr. Colwell said that, not so long ago, the metallurgist was ahead of the industry with materials perhaps better than needed, whereas today the industry is waiting for the metallurgist in many lines. In the meantime, he said, it is necessary to do the best job possible with the materials available.

Mr. Colwell pointed out the advances made by the aircraft industry which by well-engineered but expensive methods have extended the life of valves beyond any possible anticipation of a few years back. It was not so long ago that valves finally passed a 300-hr. test to the gratification of all concerned, he recalled. Today aircraft valves that have operated 5000 hr. and beyond are in excellent condition, so that their ultimate life has not yet become known, Mr. Colwell reported.

This improvement, he pointed out, has been accomplished by a combination of materials, clearances, lubrication, alignment, and surface finish. Valve-stem wear, he said, varies in different automotive and tractor engines and with operating conditions. In general, he con-

tinued, tests show that a hard valve stem wears least, but it wears the guide more; and a hard guide wears least, but wears the stem more. In Mr. Colwell's opinion, a hard-stem-hard-guide combination seems best of all. Again, he emphasized, close clearance will reduce valve stem and guide wear. Better guide materials can be used to reduce guide wear further, in addition to finish and clearance. The molybdenum irons, with additions of chrome and nickel, definitely wear better, Mr. Colwell's experience shows. The grey-iron guide has a tendency to bell-mouth, he reported, and also to grow permanently when exposed to the exhaust flame. Alloy irons are better in this respect, he finds. Definitely less guide wear can be engineered by the use of better guide materials, and close initial clearance is very important in any event, he concluded.

The relation of surface finish to engine wear was discussed by K. W. Connor, Micromatic Hone Corp., who said that an entirely new vision of quality improvement in the final finish and the production efficiency of producing internal-combustion engine cylinder bores and other engine parts is indicated in the recent adoption of controlled surface finish by two of the leading motor-car manufacturers and by one manufacturer in the industrial equipment field producing replaceable sleeves. This project comprises the accomplishment and maintenance in regular production of surface finishes in which the running average of the height of the irregularities may be held uniformly less than five micro-inches (millionths of an inch) for engine cylinder bores, from five to eight micro-inches on pistons, and from one to two micro-inches on some parts such as crankcase main bearings, crankshaft main and throw bearings, camshafts, camshaft main bearings, valve stems, piston-pins, mushroom heads on valve tappets, wheel-hub bearings, brake drums, and brake linings. The significance of this accomplishment immediately suggests, Mr. Connor said, the importance of utilizing new equipment now available to re-study the whole subject of wear and bearing tolerances in internal-combustion engines. The ability to control the generation of final surface-finish approximating the existing standard for an optical flat, has been made possible by the development of new hydraulic honing equipment for cylinder bores, new mechanical actuations of abrasive on external surfaces, and a remarkable instrument for measuring qualitative irregularities in finished surfaces, he explained. This new honing equipment, he said, comprises greater control of unit pressures by means of balanced hydraulic actuations and, as now being used in production, makes possible greater control of surface character and finish, increased production, and desirable economies in processing.

Mr. Connor added that, of major importance in this development, is the fact that these newly developed hydraulically actuated honing tools have advanced definitely into the scope of heavy stock removal under minimum conditions of molecular and structural disturbance of the metals processed, while generating substantially increased accuracy and surface finish. He spoke also of the development of the "Profilometer" as the first piece of factory-type equipment to measure and maintain final surface finish as obtained in daily production.

In conclusion, Mr. Connor said: "It may be predicted safely that, by using the new gaging equipment, much of the present uncorrelated data, as related to performance and operating factors in internal-combustion engines, may be coordinated and will point the way toward more definite accomplishment in future progress."

Affect of Lubrication

Prefacing his paper on tractor lubrication as related to engine wear, C. M. Larson, Sinclair Refining Co., remarked: "With 1,250,000 tractors in use today, the question of tractor engine wear in relation to lubrication becomes a very important study. Yet the problem is a very complex one as the types of fuels vary greatly, the load conditions and time of continuous operation are seldom the same, dust-fall is between 2 and 10 tons per sq. mile per day, and the operation-service, care, and engine rebuilding may be doubtful. Besides, engine design, combustion rates, and bearing materials all add to the variables in selecting the adopted lubricant. Clean air, efficient fuels, adopted lubricant, and proper care of operation and service are factors affecting wear of a given tractor engine."

Mr. Larson said further: "The results of most of the comparative wear-test research in recent years have shown that, in general, the compression-ignition engine has cylinder and ring wear characteristics about 85 per cent greater than the corresponding gasoline engine." He added that this wear has been reduced by the use of certain addition agents in the lubricating oils, whereas operators of spark-ignition oil engines have adopted alloyed oils to excellent advantage, although these oils are limited to babbitt bearings because they are corrosive to other types.

Mr. Larson also pointed out that many times a tractor is exposed to the elements – left in an open field or stored for weeks or months in a poorly constructed shed, or housed in a barn which gives off corrosive vapors from stock manure. Rarely is overhaul work done in a clean place, he pointed out, and invariably a

complaint involving serious damage occurs shortly after an inefficient overhaul. Tractors standing out or remaining idle in damp places for long periods get rusty and considerable internal sweating takes place, he went on. Very few farmers oil their engines throughout before storing; very few farmers examine their oil before use after remaining idle; and very few farmers flush or attempt to clean their engines before renewing their oil, he charged. The correction of these service practices alone would eliminate most of the lubricating oil complaints, Mr. Larson contended, recommending that a thorough flushing or cleaning of the crankcase after intermittent winter work would prevent bearing failures due to plugging of oil screens or lines by accumulations of sludge. Very little direct lubrication difficulty with any high-quality products in farm equipment is experienced during the summer season, he reported. Mr. Larson also said that much can be done to eliminate engine deposits and abrasives by controlled crankcase ventilation and proper filtering of crankcase intake air. In many tractors there is unmistakable evidence throughout the engine that abrasives have entered through the air intake and crankcase ventilation intake, he contended.

"The lubrication engineer's biggest handicap in handling complaints," Mr. Larson said, after enumerating the many possibilities of trouble with a tractor in the hands of a farmer, "is that they rarely are given an opportunity of investigating at the time of failure. The local operators and mechanics, before looking for mechanical or operating reasons for the trouble, jump to the conclusion that the oil is at fault."

A talk illustrated by moving pictures entitled "Reduction of Piston-Ring and Cylinder Wear" was presented by Macy O. Teetor, The Perfect Circle Co.; it is familiar to a great many members of the Society as this was its fifth presentation in the last three months at Society meetings.

Spark-Plug Selection

E. S. Twining, Champion Spark Plug Co., spoke of the selection of the proper type of spark-plug for tractors as very important because of the large percentage of work done especially at wide-open throttle. The first consideration is to avoid preignition, or even self-ignition, by selecting a comparatively cold type of plug, he said. Among the many factors affecting engine performance, he said, is one which is sometimes quite elusive and overlooked—gas leakage at one or more points through or around the plug. Even when the proper type of plug is screwed in too loosely or seated on a dirty or badly deformed gasket, he pointed out, enough leakage can occur to cause troublesome rises in temperatures. Low-octane fuel in a high-compression engine also can produce destructive results, regardless of the plug used.

Howard M. Wiles, Waukesha Motor Co., described the "dust-house" testing laboratory at his factory in which tractor engines are observed under conditions simulating those existing in the dust bowl of the West, and dust leaks into the engine through the air cleaner, carburetor, crankcase breather, crankshaft, and auxiliary drive-shaft seals are studied. This laboratory has produced pronounced and important information as to engine wear by abrasion, and with respect to materials, design and maintenance, he explained. Mr. Wiles recommended that every new model tractor be given a dust-house test which, in a single day, he said, furnishes more information than several thousand hours on the job with uncontrolled operating conditions.

In a paper on "Hardened Crankshafts and Cylinders," L. B. Sperry, International Harvester Co., said in part: "We do not believe that it has been proved that the hardest material is always the best to use on all kinds of engines where first cost, use to which the engine is put, and other factors are considered. In fact, unless extreme care is taken in finish and care is taken in the whole balance of fits and materials of pistons, rings, and cylinders, it may be found that a softer material in cylinder sleeves will show less wear on all parts than if the cylinders were extremely hard."

Mr. Sperry's paper pointed out that, with the advent of the Diesel engine, it was realized that the crankshaft would be required to withstand more severe operating conditions than on gasoline engines. Therefore, he continued, a five-bearing crankshaft with hardened main bearings and crankpins was desired for this engine from the start. At first, he related, experiments were conducted with local hardening with the acetylene torch, following somewhat the general plan of the "Doppl-Duro" method used in Germany. Some rather promising results were obtained, he reported, but about this time the electric induction heating method was developed, which seemed to be much less open to human errors. After a period of experimentation, he told how this method was adopted by his company, and is being used at present for all three-, five- and seven-bearing crankshafts in tractor engines. The crankshafts thus produced have much harder wearing surfaces than any other crankshafts with the possible exception of those which are nitrided or case-hardened, he contended. Furthermore, the hardness occurs only in the bearing portions and not in the fillets or cheeks, he added, and the strength of the core is amply high for all loads to which the crankshafts are submitted. Field results show that these electric-hardened shafts give a very much longer service than unhardened shafts, Mr. Sperry said in conclusion.

About SAE Members: ... *At Home and Abroad*

(*Continued from page 29*)

Dr. George W. Lewis, director of the National Advisory Committee for Aeronautics, will serve as chairman of the new National Aeronautical Association council which will "direct and supervise the association's international activity, its responsibilities in the field of sporting aviation and its work in the encouragement and supervision of trials for official records."

Alfred C. Howard has been advanced to the position of general manager of Fairbanks, Morse & Co., Beloit, Wis. He was previously assistant general manager.

Kenneth F. Ryder has joined the staff of the Boston Elevated Railway as engineer in the department of rolling stock and shops. He was previously assistant to the superintendent of the motor transport division, Panama Canal, Balboa Heights, Canal Zone.

William C. Gould, formerly sales engineer for United Aircraft Corp., Hartford, Conn., has been appointed director, aeronautical division, Ets. Corneliussen & Stackgold, S.A., Antwerp, Belgium.

Joseph Arthur Lemay has been named vice-president of Highway Paving Co., Ltd., Montreal, Canada. He was formerly comptroller of equipment, Quebec Provincial Government, Department of Roads.

William I. Stieglitz has joined the engineering staff of Burnelli Aircraft, Ltd., Keyport, N. J. He was formerly engineer with the Barkley-Grow Aircraft Corp., Detroit.

Clarence E. Moore, supervising mechanic, United States Department of Agriculture, Bureau of Biological Survey, has been transferred from Omaha, Neb., to Des Moines, Iowa.

Safety Award

Capt. E. V. Rickenbacker, general manager, Eastern Air Lines, received, on behalf of his company, second honors for companies flying 50,000,000 passenger-miles during 1937, in the National Safety Council's annual aviation safety award to transport operators, at a luncheon held in New York, April 19.

Following the luncheon SAE members were among those participating in a meeting of the Council's aeronautical section at which *Dr. Alexander Klemin* presided. *Franklin T. Kurt,* director of flying at the Long Island Aviation Country Club, discussed what the Weather Bureau should do for private and commercial fliers, and *Jerome Lederer,* Aero Insurance Underwriters, read his annual report as secretary.

Bring Your Camera to The 1938 Summer Meeting

Preliminary to the proposed

First Automotive Photographic Salon

at the

1939 Annual Meeting

All SAE camera enthusiasts are urged to bring their cameras to the Summer Meeting to take pictures for entry in this salon.

◆◆◆◆◆◆◆◆◆◆

Informal Photo Exhibit

at the

1938 SAE Summer Meeting

If you have some good shots of any subjects whatever, address them before June 1, to

Photographic Exhibit
c/o SAE, 29 West 39th St., New York

Required format:

Photographs must be enlargements, 8 in. x 8 in. or larger, mounted on white cardboard, 16 in. x 20 in., with as much of the following detail as possible written on back of the mounting: Camera used; Film used; Aperture (*f.* number); Time of exposure; Title of Photograph; Name and Address.

The SAE will make every effort to return the photographs in good condition, but cannot be held responsible for damage in shipment or loss.